FARMERS DIGEST

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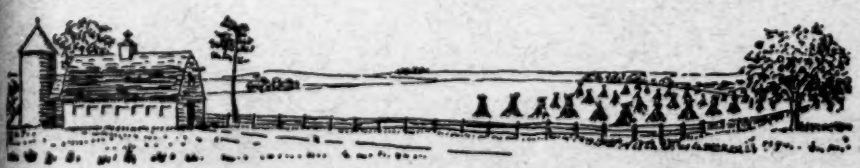

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The Farmer's Digest

Volume 8 August–September, 1944 Number 4

Humus "Carries the Ball" for Fertilizer

Condensed from American Agriculturist

George Serviss

THE miracles of modern chemistry have so intrigued the public that many people feel that successful modern farming rests upon test tubes, various colored testing solutions, and chemical fertilizers. Chemical fertilizers are important; in fact, in the Northeast they are essential for high production on most soils. The test tubes and the testing solutions are also important, but they will not solve all production problems.

Chemicals alone, are not enough for a successful, permanent agriculture. Attention must be given to other things and one of the most important is organic matter. Failure to replenish organic matter as a result of economic pressure on one hand and too great faith in chemical fertilizers as "cure alls" on the other, has already resulted in declining yields on some soils.

Organic matter is not added to soils just for the sake of storing it up. It is put there to use. There is no reason why it should not be used. It accumulates under sod and decreases with cultivation. The thing to do is to adopt practices that will maintain soil organic matter at a satisfactory level. Nor is there any definite percentage that must be maintained in all soils; some soils need a higher organic matter content than others. The important thing, with most intensively cultivated soils is to halt the downward trend in organic matter content. On many soils that have been badly depleted through serious erosion or complete neglect of organic matter replenishment, steps must be taken to rebuild the organic matter content to restore their original productivity.

Soil organic matter is important for several reasons. It promotes granulation and thus improves soil structure. It increases

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pore space and consequently improves aeration and water penetration. Last, but by no means least, it serves as a storehouse for plant food and as a source of food and energy for the vital soil bacteria. To sum it all up simply; it improves both soil tilth and fertility.

The matter of granulation and structure is very important in heavy soils such as clays, clay loams, and silty clay loams. These soils are richer in plant nutrients than lighter soils, but they must be carefully managed to be productive. Organic matter binds the minute clay particles into granules which might be considered as building blocks. When a well granulated soil is plowed and worked it breaks apart, but the granules or blocks hold together. A farmer usually employs the term "mellow" to describe such a soil. A heavy soil that is not well granulated is difficult to plow. It breaks up into hard clods which make seedbed preparation slow and laborious. "Crusts" form following rains with a result that seeding failures are common. Well granulated heavy soils can be worked at higher moisture contents without puddling than those not well granulated and can be plowed with less difficulty at low moisture contents. Hard crusts that interfere with seedling emergence seldom form.

With light, sandy soils the story is a little different. The particles are so coarse that they do not form granules to any appreciable extent. With these soils, it is a question of adding "body"; of making a sand more like a loam.

Next is the matter of increased pore space with its effect on aeration and water penetration. Lack of aeration retards biological activities and plant growth. Slow water penetration reduces the amount of water falling in any given rain that is stored in the soil for use by plants. Slow penetration means increased runoff and increased evaporation before the water gets into the soil. This is especially important during the summer months when much of the rain falls in short, hard thunder showers.

The matter of plant food is vital. Organic matter is a storehouse of plant food and of primary importance is its nitrogen content. The phosphorus content of a soil can be built up by the addition of phosphatic fertilizers, as phosphorus is lost very sparingly by leaching. Nitrogen, on the other hand, leaches readily after it is once in the nitrate form. Irrespective of what commercial fertilizer is used as a source the nitrogen in it is likely to be quickly transformed to the nitrate form whenever soil temperatures are high enough to permit normal plant growth. A re-

serve soil supply can be built up only by increasing the organic matter additions. Other things being equal, the nitrogen content of a mineral soil is a very good measure of its productive capacity.

The soil is not a sterile thing, it is literally alive. A piece as large as a fair sized marble may contain a billion or more live microrganisms. Many vital processes are dependent on the presence of these organisms. They speed the decay of organic matter, thus liberating plant nutrients; they fix nitrogen from the air; and by their action many unavailable forms of plant food are changed to available forms. These processes and many others in which the soil organisms play a vital part require energy. The soil organic matter is the main source of this food and energy.

The organic matter content of most virgin soils declines rapidly during the first few years of cultivation. After several years of cultivation, the organic matter content of a soil will have declined to a point where it is not only practical but necessary to stabilize it. If it declines beyond this point productivity will also decline. The organic matter content of most northeastern soils has already declined to or past this point, so that organic matter replenishment is now essential.

1. Protect the soil against erosion. Contour tillage may be enough on some fields, on others it may be necessary to combine contour tillage with strip cropping and diversion terraces. Readjusting the crop rotation so as to eliminate row crops or at least to reduce the frequency with which they occur on a given field is a method that should be used more often than it is. Hay and pasture sods are very effective in reducing erosion. Use winter cover crops wherever they are practicable.

2. Conserve manure. Manure is the most important fertilizer used by dairy farmers, and is an excellent source of organic matter. It should be conserved, balanced with superphosphate, and spread over as much land as is practical each year.

3. Apply lime to all soils that need it. The leguminous crops, such as the clovers and alfalfa, are more valuable for soil improving purposes than other crops. They contribute organic matter high in nitrogen and also activate the nitrogen present in the soil. The most valuable legumes for soil improvement purposes have a high lime requirement.

4. Fertilize—Use well-balanced commercial fertilizers liberally. They increase plant growth; root growth as well as top growth. While they do not contribute organic matter directly they in-

crease the amount of crop residues left after harvest.

5. Conserve all crop refuse where the practice does not aggravate insect and disease problems. The sale of straw is justifiable when a fair price can be obtained for it, but the burning of straw is indefensible.

6. Use green manure crops where other sources of organic matter are insufficient. When 100 per cent of the crop land is in cultivated crops, soil depletion is rapid. It is frequently advisable to reduce the cultivated crop acreage sufficiently to permit the growing of a green manure crop about every fourth year.

7. Avoid unnecessary cultivation. Frequent stirring of the soil hastens the decomposition of organic matter. Some cultivation is a good thing, but it can be carried to excess.

Raises Production 24 Percent in Year

Management is a powerful factor in getting milk and butterfat from a herd of cows. The proof of this is seen in what one dairyman in New Jersey has recently accomplished. He took over a herd of seventeen cows in 1941. The previous year, the average production was 6,700 pounds of milk and 337 pounds of fat. At the end of the first year that he was on the job the average as completed in the D. H. I. A. was 8,600 pounds of milk and 419 pounds of fat. Practically the same cows were in the herd both years. All milking was twice daily. The main reason for the difference in yield was in the heavier use of good roughage, particularly hay. Each cow was studied individually and catered to. New ways of doing things also played a part. It was noted that the hired man, although good in most particulars, was not an efficient milker. The manager found that he could get ten pounds more milk daily from certain cows than could this employee.

—N. J. Farm and Garden

Rebuilding Eroded Soil is a Slow Process

Condensed from Soil Conservation

R. E. Uhland

Research-Operations Liaison Officer, Soil Conservation Service, Washington, D. C.

THE rebuilding of severely eroded areas is an integral part of the soil conservation problem. Many soils have already lost a large part of their top soil, and their production has been seriously lowered. Appropriate steps should be taken to check erosion and restore production.

Experimental plots established on the soil conservation experiment stations at Temple, Texas, and Bethany, Mo., show that the productivity of poorly protected top soils is lost very rapidly by erosion. These experiments show, further, that once the humus-charged granular topsoil is removed the exposed subsoil usually absorbs water more slowly, loses more water as run-off, erodes more quickly, and produces poorer crops. Even with the best of management these exposed subsoils regain very slowly their organic matter and their ability to produce crops.

At Bethany, Mo., the organic matter content of the 0.7-inch layer of topsoil was 3.23 percent in 1930. With 13 years of continuous cropping to corn, the soil loss through erosion was 51 tons annually or 4.9 inches. The organic matter of the remaining topsoil decreased to 2.23 percent, representing a decline of 10 tons of organic matter in 13 years. Under a 3-year rotation of corn-wheat-hay, the soil loss was 7.2 tons annually, totaling 0.7 inch for the period. The organic matter remained unchanged at 3.23 percent.

Where alfalfa or grass occupied the land for 13 years, the soil loss for the entire period was less than 0.01 inch. The percent of organic matter for the alfalfa plot increased to 3.93 percent; and for the grass plot, to 3.61 percent. Thus, under alfalfa the organic matter in the 0.7-inch layer of soil increased 0.70 percent or 7.0 tons per acre; while under grass, the increase was 0.38 percent or 3.8 tons per acre.

A soil-renewal experiment was started at Bethany to see how rapidly the organic matter and the crop yields of the exposed subsoil of the Shelby silt loam might be increased. The cropping

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systems used, together with the treatments applied and the crop yields secured for the 11-year period 1932-42, are shown in table 1. The corn yields were especially low, because two of the three crops on plots 1, 2, and 3 were near failure because of drought and insects. In the case of plots 4, 5, and 6, one of the four corn crops failed because of drought and insects.

In 1942 corn was grown on all the soil-renewal plots to see how past treatments might be reflected in corn yields. Corn production, together with percent of organic matter and cumulative soil and water losses for the period 1932-42, are shown in table 2.

It will be noted that the corn yield for plot 2, which was the untreated subsoil, was slightly less than 48 percent of the yield of plot 1, the normal untreated top soil. This was true for the average of the three crops as well as for the 1942 crop. Plot 3 was limed and cropped to the same 4-year rotation as plots 1 and 2 but received 200 pounds of superphosphate per acre on the oats, yielded 83 percent as much as the untreated topsoil for the 3 years and 84 percent for 1942.

Plot 5 was limed, superphosphate was applied before oats, and a 3-year rotation of corn-oats-sweet clover followed, with the sweet clover turned under in the spring before corn. With this treatment, the corn yield in 1942 amounted to 102.3 percent of the yield from the untreated surface soil cropped to a 4-year rotation. When manure at the rate of 8 tons per acre was applied before turning under the sweet clover for corn the yield was raised to 64.6 bushels or 150.2 percent of the yield for the untreated surface. On plot 7 which was limed and fertilized and seeded to a grass legume mixture which occupied the land for 10 years the corn yield was 44.2 bushels, or 102.3 percent of the yield for the surface soil that was not treated.

The freshly exposed subsoil at Bethany contained 1.71 percent of organic matter in 1930. Where it was clean fallowed for 13 years the average annual run-off measured 8.7 inches and the soil loss 56.5 tons or 5.5 inches for the period. The organic matter during this period decreased to 1.41 percent, a loss of 0.3 percent or 3 tons of organic matter per acre.

Where a 4-year rotation of corn-oats and 2 years of hay was used on plot 2, the loss on the untreated subsoil was 1.2 inches for the period, but the percent of organic matter in the top 7 inches increased to 1.93, a gain of 0.22 percent, or slightly more than 2 tons per acre. By applying lime and fertilizer to the exposed subsoil (plot 7), seeding a grass legume mixture, and allowing all the crop growth to remain on the

Table 1—Crop Yields on Soil Renewal Plots at Bethany, Mo., for 11-Year Period 1932-42

Plot No.	Cropping system	Treatment	Crop yield per acre		
			Corn Bushels	Oats Bushels	Hay Tons
1 1	C—O—Cl. & T—Cl. & T	None	14.6	16.3	1.03
2	C—O—Cl. & T—Cl. & T	None	7.5	3.9	.46
3	C—O—Cl. & T—Cl. & T	L+P	12.1	16.6	.95
4	C—O—Cl. & T	L+P	17.4	20.6	.80
5	C—O—Sweet Clover	L+P	22.9	23.5	S. Cl. under
6	C—O—Sweet Clover	L+P+M	29.1	28.0	S. Cl. under
7	Grass and Legume mixed	L+P	2 Only 1 crop	No harvest	No harvest

1 All plots desurfaced (exposed subsoil) except Number 1, moderately eroded surface soil.

2 Plot 7 remained in grass and legume mixture for period 1932-41, when it was spaded and put in corn along with all the other plots.

C—corn; Cl—clover; L—lime; O—oats; P—phosphate; T—timothy; M—manure, 8 tons/acre before corn; S. Cl.—sweet clover.

Table 2—Data on Soil Renewal Plots at Bethany, Mo. (See Table 1 for Systems and Soil Treatments)

Plot No.	Corn yield 1942 Bushels/acre	Organic matter 1943 Percent	Soil loss 1932-42 Inches	Water loss 1932-42 1 Inches
1	43	2 2.84	0.83	42.9
2	20.5	1.93	1.22	48.4
3	34.6	1.96	.53	29.7
4	32.2	1.89	.76	39.6
5	44.0	2.00	.72	33.0
6	64.6	2.26	.62	34.1
7	44.2	2.16	.007	12.1

1 The total rainfall for the period 1932-42 was 324.5 inches, an average of 29.5 inches per year.

2 The normal surface soil in 1932 contained 3.02 percent organic matter and the freshly exposed subsoil contained 1.71 percent organic matter.

plot, the soil loss was but 0.007 inch per acre for the 11-year period. The percent of organic matter was raised to 2.16 percent, representing a gain of 0.45 percent or 4.5 tons per acre.

These findings show that under a 4-year rotation (plot 1) on the normal surface soil of the moderately eroded Shelby silt loam the organic matter was lowered during an 11-year period from 3.02 percent to 2.84 percent. In another experiment, 13 years of continuous cropping of the surface soil to corn decreased the organic matter to the extent of 1 percent, or the equivalent of 10 tons per acre. On an adjacent plot cropped to a 3-year rotation the organic matter was maintained at 3.23 percent for a 13-year period.

If we assume that these rates of change in organic matter on these desurfaced soils will continue, it will require but 66 years of cropping to a 4-year rotation of corn-oats and 2 years of hay to build the organic matter up to the level contained in the topsoil as it was tested in 1930. By liming and fertilizing and seeding to grass legume mixture (plot 7) and allowing all crop material to fall back on the desurfaced soil, the organic matter equivalent to that contained in the original topsoil could be attained in a little less than 30 years.

Exposed subsoils, however, are usually more difficult to cultivate, allow more run-off, have less plant food, and make less effective the rainfall with which to make a crop. Unless erosion and run-off are controlled, much of the plant food applied as fertilizer may be lost. It should be pointed out that the cultural operations on these soil-renewal plots were carefully performed and the run-off and soil losses were held to a minimum. Under field conditions plowing of severely eroded lands or exposed subsoils average much shallower, and the run-off and soil losses are much greater.

Obviously, the rates of change in organic matter recorded for the desurfaced plots are greater than would occur under normal field conditions.

Most investigators have found that cultivated soils accumulate organic matter at a much slower rate as the organic matter increases. In other words, we would expect it to take a great deal more time and be more difficult to increase the organic content of a soil at a given location from 2.5 percent to 3.5 percent than to increase it from 1.5 percent to 2.5 percent. It might be noted also that (plot 1) the normal surface soil contained 3.02 percent organic matter in 1932 but without treatment declined to 2.84 percent, a loss of 0.18 percent, or 1.8 tons per acre in 11

years. These observations would indicate that the accumulation of organic matter in these soil-renewal plots will become increasingly slower, and the time required to bring the organic matter above 3 percent (that found in the topsoil in 1932) will be greater than indicated above. There is a question as to whether it can ever be raised to this point while cropped to cultivated crops. If left in grass and legumes, as in plot 7, it is possible that in time the organic matter would be restored.

At Temple, after ten years of cropping to cane, Sudan, and oats and the growing and turning under of a green manure crop each year on the Marly C horizon of the Austin clay, the organic matter was 1.37 percent. Where grass occupied the untreated subsoil for the entire period, the organic matter had increased to 1.60 percent. The organic content of the originally exposed subsoil is not known and we cannot, therefore, tell what change occurred on the cropped plot. If, however, we assume that the organic matter was evenly maintained on the cropped plot, it was increased the equivalent of 0.23 percent under grass. This represents a gain of 2.3 tons of organic matter in ten years.

The original Austin topsoil contained 2.8 percent organic matter, 1.43 percent more than the exposed subsoil. At this rate of increase it would require a little more than sixty - two years of grass to bring the organic matter of the subsoil up to that contained in the topsoil. This Marly subsoil consists of about sixty–eight to seventy-five percent calcium carbonate, and the results show that these soils do not respond sufficiently to commercial fertilizers to pay for the extra cost. Good response, however, is obtained from legumes, green manure crops, and barnyard manure. Legumes commonly used for soil building do not, however, do well on this soil because of root rot, and manure is scarce. The building of organic matter and nitrogen in these exposed subsoils is, therefore, a very slow process.

At Temple the corn yield for 1943 for the non-desurfaced Austin clay was 27.6 bushels per acre, while for the desurfaced soil, representing the Marly C horizon, was but 16.4 bushels. Thus, after this desurfaced plot had been cropped to row crops for the period 1932-43 with a green manure crop that was turned under each year, the corn yield was but 59.4 percent as great as from the non-desurfaced plot where no green manure crops were grown or turned under.

Color tests were made of the soils from a number of the plots

at both Bethany and Temple. It was found that there were some changes in color values; where the organic matter had increased appreciably the color was darker. This was not necessarily always true. The color value for the freshly exposed subsoil at Temple was 7.0, while that for the exposed subsoil on which grass had been growing for ten years was 6.8. The topsoil of the Austin clay showed a color value of 5.5. It should be added that the higher the number, the lighter the color of the soil.

After thirteen years of alfalfa at Bethany, the color value was 3.4 and the percent of organic matter was 3.93, compared with a color value of 3.2 and organic matter content of 3.61 percent after thirteen years of grass. The desurfaced soil cropped to a four-year rotation for twelve years without treatment had a color value of 4.2, with 1.93 percent organic matter. Where a grass and legume mixture occupied the desurfaced soil for twelve years, the color value was 4.1, with 2.16 percent organic matter. The hue and the Chromatic values changed very slightly for the soils at both Bethany and Temple.

The data from these two widely separated locations show that the organic matter of badly eroded soils was increased and the yields improved, but the rate of increase was very slow and may be expected to be slower as the level of organic matter increases. In order to increase the organic matter appreciably in badly eroded soils, a cropping system must be used which controls erosion and a large portion of the vegetative growth must be returned to the soil. By adding barnyard manure, along with fertilizer and lime, the soil was improved more rapidly than without treatment. Observations showed that crop production on the exposed subsoil plots, as well as on severely eroded plots or fields, was affected more seriously by dry weather than was the normal surface soil. The findings indicate that in order to increase appreciably the organic matter in badly eroded soils it is necessary to supply needed fertilizers and maintain them in non-cultivated crops most of the time.

Good Pastures Mean Greater Income

Condensed from Guernsey Breeders' Journal

E. N. Hansen

Associate Professor of Dairy Husbandry, Iowa State College

ALL dairymen welcome the time when they can turn their cows out to pasture. Good pasture means greater production and profit from the cows. There are several reasons for this. First, green grass is very close to a balanced ration, containing the essential ingredients of protein, minerals, and vitamins that the animal needs. Second, it is a succulent feed, supplying sufficient water. Third, grass is a palatable feed — one which the animal likes. Fourth, during the months of May and June, and parts of the other pasture months, the cow is comfortable, both as to surroundings and temperature; and fifth, pasture grass is an economical ration, leaving us greater profit.

The factors causing peak production on pasture are so important that during the off-pasture season — the winter months — we try to duplicate them as closely as possible. We do this by providing a balanced ration, succulent feeds, palatable feeds, sufficient water, comfortable barns and stalls, and ventilation. Then, if we have well-bred cows with ability to produce, they are given a chance to live up to their ability and we should get high production.

Now, the old and time-worn "if" comes in. I hear you saying, "But we don't always get such results. Our cows do quite well on pasture for a few days, but then they get thin and run-down and fall off rapidly in milk flow."

Just such a condition often happens and it is not the cow's fault, but our fault. We have not made only one mistake but several, among which are: a poor stand of pasture grass, depleted soil, acid soil, turning cows on pasture too early in spring, overpasturing, and omission of grain feeding while cow is on pasture.

We are making fewer of these mistakes today, because we are beginning to realize the full value of pasture grass. People in England, Scotland, the Islands of Jersey and Guernsey, Holland and Denmark, have long appreciated the great value of pastures for dairy cows. Visitors to these countries, in normal times, are

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impressed with the excellent pastures and their high carrying capacity as to the number of cows on them. The pastures are top-dressed with fertilizers, kept free of sod-bound condition and of weeds, bare spots are reseeded, and the pastures are carefully managed so as not to be pastured too early in the spring, before the grass has opportunity to get well started.

I mentioned the point of feeding grain to cows on pasture. Though good pasture grass is about a balanced ration, as to kind of ingredients, there is not enough carbonaceous material or energy for a heavy-producing cow. Just a fair cow would produce about 35 pounds of 4.0 percent milk a day. Yet that production would require about thirty pounds of dry matter in her feed. Young pasture grass is rather "washy," containing about 80 percent water and only 20 percent dry matter. So in order to get the 30 pounds of dry matter required, the cow would have to eat about 150 pounds of grass a day. Some cows on good pasture would do this, but others would not, and could not if the pastures were poor. Animals with a strong impulse to give milk would continue to produce heavily for a time, but would take nutrients out of their own bodies. This depletion would soon cause them to become thin and run-down.

So, by all means, feed the good cow grain while on pasture as well as during the winter months. We can well afford to feed grain to cows producing one or more pounds of butterfat daily. A mixture of 400 pounds of corn and cob meal, 400 pounds of ground oats, 100 pounds wheat bran, 100 pounds protein supplement, 20 pounds steamed bone meal, and 10 pounds salt is very satisfactory. It can be fed at the rate of one pound of grain to four to seven pounds of milk, depending upon the richness of the milk, the kind of pasture, and the condition of the cow.

In our Dairy Herd Improvement Associations, 98 percent, or nearly all of the owners of the high herds, fed grain to their cows on pasture. On the other hand, in analyzing the low herds, it was found that only 50 percent or one-half of the owners fed grain on pasture. So perhaps it was not entirely the cow's fault that they were low in production. In fact, the kind of cows and the kind of care and feed given them are about a 50-50 proposition in milk production.

Many dairymen are now following a plan of having "all-season" pastures. They start early in the spring with winter wheat or rye. Rye pasture has been objectionable because it causes pronounced flavor of the milk. Experiments are now being

made with a new variety, called Balbo Rye, which is claimed not to affect milk flavor. From May to July comes blue grass or legume pastures. These fade considerably, especially the blue grass, during the hot months of July and August, so at that time come drought-resistent pastures such as brome or sudan grass. Then, in the fall the brome, legumes, or the blue grass will continue to provide good feed.

A permanent seeding of ten pounds brome grass, four pounds sweet clover, four pounds medium red clover, and six pounds alfalfa can be seeded in the spring with about two bushels of oats per acre. The brome and legumes will not provide much feed until the following year. But the oats will provide considerable pasture the first year.

Many dairymen are renovating their old permanent pastures, which have become thin and weedy. The old sod should be fertilized and well disked. Then, seed a mixture of legumes, such as five pounds biennial white sweet clover, three pounds medium red clover, and two pounds of alsike clover per acre on sweet or limed soil.

Some dairymen have had good results in alternating pastures. The pasture is divided into two or more fields and pastured in succession. This allows more even grazing, saves loss from tramping and provides more feed because when given a rest period, the grass has a chance to grow.

In pasturing legumes, there is some danger of bloat of cattle, but careful management will greatly reduce this trouble. When starting cattle on legume pasture, they should be given a good feed of hay and grain, and not turned out until towards noon, so there is no dew or moisture on the grass. After once turning on the pasture, most dairymen leave the cattle on continuously. Provide salt and water. It is also a good plan to provide access to steamed bone meal and charcoal.

Pasture is good for all live stock. Provide plenty of it so that not only the milk cows, but also the dry cows, yearling heifers, heifer calves and the herd sires can be on good pasture. Separate pasture plots should be provided for the bulls. Good grass will keep them in better breeding condition.

In conclusion, I want to repeat that many of us need to change our attitude of thinking that lands in pasture do not make returns like our cultivated land. or that "just anything" is good enough for pasture. Our cattle do not have that attitude! Theirs is just the opposite, for they appreciate pasturetime and do their best on it.

Freedom from Mortgage

Condensed from Farm Journal and Farmer's Wife

Robert Cruise McManus

NO man who ever bought a farm from A. T. Logan at Fort Atkinson, Wisconsin, has lost it. He can't very well fail, and the reason is that only half the hog and cow money, high prices or low, go on the purchase contract.

Logan has been making farm owners out of tenants for twenty-six years. His plan survived without a single casualty during the collapse in land values after 1920, and the tobogganing of commodity prices in the 30's. 80% of his clients are now their own landlords, with the rest approaching the goal.

Logan is not a government hand-out artist, a bureaucrat nor an eccentric millionaire. He's a white-haired, cigar-chewing, small-businessman, who makes his own living running the new-fangled-old-fangled real estate proposition.

Half a century ago he was a farm boy himself, and never since has he had more than one foot off the land. Throughout his life he has seen foreclosures, evictions and tragedy come to many friends, and the spectacle never ceased to make him suffer.

So he decided to do something about it. The result was the "Loganway Plan."

"Loganway" rests unshakably on four pillars: (1) Sound farms; (2) Sound families; (3) Sound farming; (4) Sound finance. A "sound farm," as Logan learned from experience, is one whose soil, pasture, cropland and buildings will return a respectable income to a farm family. He never buys a farm without completely checking its physical equipment and soil.

After he's purchased a particular property, Logan picks from his list a family that he thinks will be able to handle it.

The first requisite in that husband and wife prove their ability to pull together. Logan will have nothing to do with folks who can't manage their domestic affairs.

They must also provide their own equipment and livestock. Sometimes he requires a down payment of 10% to 20%. Sometimes he takes a chattel mortgage

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on the applicant's personal property.

Then comes the signing of the lease by which the applicant agrees to operate according to the Loganway plan. This provides that he will maintain a specified number of cows and hogs; grow all his feed, except concentrates; join a dairy herd improvement association if asked; get rid of any cow which can't make 245 pounds of butterfat a year, and sell no hogs under 200 pounds.

The number of cows and hogs specified by Logan is determined by the capacity of the land to support them. He estimates this capacity by checking over the local crop production figures for the past thirty years, and choosing the poorest ten-year average during that time. Thus, the land must produce only at a minimum to feed the number of animals specified.

Now for the financial arrangements:

The applicant agrees to turn over *half the money from his* milk and hogs only. He has no mortgage payments to meet, nor any taxes, insurance or bill for interest. Logan takes care of these out of his share of the proceeds, figuring interest at 5%. Whether a farmer has a good year or bad, his payments are still only half the milk and hog income. *There is no way of putting him off the farm, except for failure to live up to his agreement.* When his total payments, minus taxes, insurance and interest, equal the purchase price originally agreed upon, the farm is his, free and clear.

One hundred and twenty-one farmers in Jefferson county and thereabouts have become their own landlords—an average of about eleven years per man—since the Loganway method first went into operation. Thirty-two more are headed for ownership. The first man to prove out was one who had already failed on his own place, and was about to lose it through foreclosure. Logan bought it and gave him another chance.

Things have turned out this way because the plan is calculated on conservative yields and low average prices.

Take the story of a tenant we will call Fred Potts.

Potts moved onto a 110-acre place in March, 1942. He had 26 cows and 2 sows. He agreed to produce 6379 lbs. of butterfat per year. At an estimated average price of 45 cents per lb. this would total $2866.50. His pig quota was to be eighteen a year. If sold at an average of $7 per cwt., weighing 200 lbs., they would bring $252 per year.

This would add up to a gross milk and hog income of $3318, which would mean $1559.25 for Potts and $1559.25 for Logan. It

was also calculated that Potts would pick up an additional $1120 from sales of cattle, calves, poultry, eggs, fruit and other income. This would be all his, and would give him a total of $2479 with which to run his farm and take care of his family, over and above his payment on the farm.

According to his reckoning, he would have owned the place in twelve years and three months. But—although milk income had been calculated on rock bottom prices, Potts got into the Grade A Chicago market. Both hog production and prices received were far above estimate.

At the end of the first twenty-two months, Potts was $2500 ahead in payments.

Isn't there anything wrong with this Loganway proposition?

A prospective purchaser asked Logan's clients this question before he signed up. Here are some of their answers:

"It is the only safe way I know of for a poor man to purchase a farm and positively pay for it."

"It is practically the same as renting a farm on halves, only the half you pay out goes for your own farm."

"We are free to operate as we like, so long as we keep a certain amount of livestock. We can keep more but not less."

"I am my own boss."

Remember, though, that this plan is no different from any other in one respect: *a family mustn't pay more for a farm than its earnings justify.* As always, if you pay too much you work too long to pay out. And to be successful, the plan must be in the hands of men—both on the land and in the renting office—who know good farming from bad.

A. T. Logan and his Wisconsin clients are that kind of people. There are plenty more like them throughout the country, who might find the Loganway method the best way to buy and pay for a farm.

Hybrid Pigs

Condensed from Hog Breeder

CAN livestock production be increased by the use of hybrid vigor to the same extent that corn production has been increased and can this hybrid vigor be obtained within a pure breed? The Oklahoma Experiment Station working in cooperation with the Regional Swine Breeding Laboratory of Ames, Iowa, is attempting to answer these questions with Duroc swine.

The Regional Swine Breeding Laboratory was organized in 1936 by the Bureau of Animal Industry of the United States Department of Agriculture cooperating with the Agricultural Experiment Stations of the Corn Belt. The Oklahoma Experiment Station was included in this laboratory. The objective of the laboratory was the improvement of swine through the application of breeding methods. Characters for which improvement was sought include productiveness of sows, growth rate of pigs, economy of gains, physical vigor and quality of carcass. The laboratory started the task of developing specific lines within a breed by selection and inbreeding. The inbred lines were to be developed and then used for crossing with other inbred lines to see if "hybrid vigor" resulted.

The Oklahoma Station started a project with Duroc swine in the fall of 1937. The project has been carried on in cooperation with the Regional Laboratory since that time. Four inbred lines of Durocs were developed. Line one had already been inbred in another project and was retained to be used in this project. It has been necessary to discard two lines to date and start two new ones. One was discarded because of a lack of fertility and the other one was discarded on account of inverted nipples. Moderate inbreeding is being used in this project. Most of the mating are half-brother x half-sister.

In the fall of 1943 fifteen litters were produced by crossing lines one and three. Seven, line one sows whose inbreeding averaged 39% were mated to line three boars whose inbreeding averaged 28%. Eight, line three sows whose inbreeding averaged 25% were mated to line one boars whose inbreeding averaged 36%. While the inbreeding within the lines has not progressed very far, it was considered worthwhile to

Reprinted by permission from the Hog Breeder, Chicago, Ill., June, 1944

check the combining qualities of the lines especially since some preliminary crosses have shown promise.

It seemed advisable to check the "line cross" pigs with crossbreds as well as the pure line. Crossbred pigs were produced by mating line one sows to a highly inbred Poland China boar from the Minnesota Experiment Station. The four comparisons made were "line cross," crossbreds, pure line 1 and pure line 3. The line cross litters were superior in about every respect to the better one of the parent lines. There was no difference in the economy of gains. The line cross pigs gained faster from weaning time to 180 days of age. They were better in this respect than the crossbred pigs. The crossbred litters were a trifle larger at birth and a larger percentage of the pigs were raised to 180 days of age. Hybrid vigor seems to be manifested in the line cross litters.

The average daily gains made by line cross pigs during the fattening period were compared with the gains made by pure line and outbred pigs. The line-cross pigs gained a quarter of a pound more per head per day than the outbred pigs. The line cross pigs are from the fifteen line cross litters mentioned above. These pigs were raised together and they were fed out in 6 different lots on concrete floors. The ration seemed to be deficient in some respect and these pigs did not gain as fast as was expected. The line cross pigs, however, gained more rapidly than the pure line and outbred pigs.

Pigs produced by crossing two inbred lines which were inbred 38% and 27% were compared with inbred pigs from each of the two lines which were used in the cross. They were also compared with outbred and crossbred pigs.

The average size of litter farrowed was increased by one pig in the line cross litters over the average of the two pure lines, while the size of litter at 180 days of age was increased by 1.7 pigs.

The line cross pigs were no larger at birth and very little if any larger at weaning but they were 59 lbs. larger than the average of the pure line pigs at 180 days of age.

The line cross pigs gained between 1/6 and 1/4 of a pound per head per day faster than outbred pigs.

The line cross litters were 1.3 pigs smaller than the crossbred litters at 180 days of age but the line cross pigs gained over 1/4 of a pound per head per day faster than outbred pigs.

The line cross litters were 1.3 pigs smaller than the crossbred litters at 180 days of age but the line cross pigs gained over 1/4

of a pound per head per day faster than the crossbred pigs from weaning to 180 days. This made the line cross litters 34 lbs. heavier than the crossbred litters at 180 days of age.

The results presented here definitely indicated that "hybrid vigor" is manifested in the line cross pigs as well as the crossbred pigs. Environmental conditions vary so much from season to season that it will be necessary to test the line cross litters during a few more seasons.

Oats for Swine?

Timely information for swine growers short on corn, but long on oats, comes from E. L. Quaife, Iowa State College feeding expert.

Brood sows on good pasture, bred for fall farrow, will do very well on whole oats, either hand-fed or self-fed. Gilts farrowing their first litters might need an ear or two of corn a day.

For growing and fattening hogs, Quaife believes, you get the greatest value of oats if fed in limited amounts, about one-fourth to one-half of the ration. However, if oats is the only grain available, best results may be had from grinding and soaking for 12 hours, then feeding as a thick mash. Hogs do not much like whole oats or dry ground oats, and will not eat enough to make satisfactory gains; hence the soaking.

—*Farm Journal*

Substitutes for Dairy Help

Condensed from Capper's Farmer

G. Bohstedt

University of Wisconsin

DAIRYING requires more labor than any other major farm production.

So to meet the goals for feed and food production assigned to them this year, dairymen will need to employ their ingenuity in saving and avoiding labor. Some means are at hand or can be devised. Forage harvest is the farmer's peak manpower requirement. The job can be simplified. One of the most effective measures is the motorized buck rake, homemade or commercially manufactured.

These rakes may bring the hay to the stacker, to the barn, or to a stationary chopper or baler. Ohio studies by F. I. Morison indicate these outfits have reduced the man-hours needed per ton of hay from 3.1 for the ordinary wagon and loader, to 1.7 for a motor buck rake. Such a device has thus gone a long way toward the rock-bottom figure in that investigation which was 1.2 man-hours per ton harvested by a large field chopper. But haying with the buck rake, largely because of its cheapness, showed the lowest cost per ton among the 7 different methods used.

To lengthen the haying season and thus to avoid the necessity of putting up hay in a rush, some Wisconsin farmers are giving alfalfa a setback in April by pasturing it when only 2 or 3 inches high, or by clipping it with a mower when only about 5 inches tall. This delays the cutting of this particular crop for nearly 2 weeks and eases the peak load of labor during haying. What's more, it is likely to throw haying into steadier sunny weather. Also, if by chance the regular pasture has become dry and brown due to an early summer drouth, the alfalfa crop, instead of being cut for hay, can then be used for pasturing. Such early-season treatment results in a 25 per cent lighter yield, but this is compensated by finer-stemmed, leafier, more nutritious hay. One precaution is that a setback of this kind be given only to a vigorous stand of alfalfa, not to an old growth which is apt to turn out weedy.

A pickup chopper gives a tremendous advantage. Where the

Reprinted by permission from Capper's Farmer, Topeka, Kansas, June, 1944

hayfield is not too far from the barn, even a 2-man crew has been giving satisfactory results—1 man to operate the field harvester which puts chopped hay into a trailer, the other to haul and unload into a blower.

In a dry midsummer pasture season, grass silage can also pinch-hit to good advantage. From the standpoint of labor, grass silage making is per unit of feed the most demanding, unless made easy by a field harvester which combines the functions of mowing, chopping and elevating into a trailer, or into a truck or wagon pulled alongside. In the absence of such a machine, extra hard work can be avoided by using a green-crop loader behind a rack with a smooth floor to permit pulling the load off at the ensilage cutter by a rope device. In an emergency a 3-man crew, one in the field for putting on light loads with a loader, a second for hauling, and a third for feeding the forage from the ground into the ensilage cutter, can do the job. It may be necessary to rotate the men due to the heavy work of feeding the cutter. If ground grain or other preservative is used, a device for applying it will be needed. If untreated, wilted green forage only is to be ensiled, a periodic use of the mower in the field suffices. The crop can be cut hours ahead of hauling.

Since, at best, harvesting roughage in any form involves considerable labor, it will be advantageous to let cows do their own harvesting on pasture to the fullest extent possible. Of all feeds, pasture is the cheapest. Dr. H. B. Ellenberger, of Vermont, reports the costs of producing 100 pounds total digestible nutrients: In grains or concentrates, $4.33; in hay, $2.00; in silage, $1.87; in pasture, $0.71. Pasture grass is richest in vitamins, saves protein, stimulates milk flow, conserves soil, and reduces labor. Obviously it pays to manage pastures properly — to renovate them, to use the right seed, to fertilize if necessary, and to rotate livestock—to insure lush green grazing from early spring until late fall.

Labor is a larger item in milk production costs than for any other livestock commodity. If cows did not have to be managed individually, stanchioned, fed, milked and otherwise looked after, the mechanization in the barn would, no doubt, rival in effectiveness mechanization in the field. But the use of power equipment, including milking machines, multiplies the work output of a man by two. Fast milking or 3-minute milking by machine is being rather widely adopted. It saves time, takes less stripping, results in just as much milk, and in less injury to udders.

For such milking, however, it is necessary that udders be wiped and manipulated very shortly before applying the teat cups. The milk usually is let down quickly, for which reason a long delay between cleaning the udder and applying the teat cups defeats the object. When first changing over to fast milking, a little more stripping needs to be done, but most cows in a few days readily adjust themselves to the speed-up.

Mechanical devices for handling silage or other feed, and the mechanization of barn cleaning and manure removal greatly expedite the work of a man. The 1-man dairy barn is talked and written about a great deal.

Might the pen barn with adjoining room for milking be the answer? A pen barn permits the accumulation of manure for weeks at a time, which, compared with a stanchion floor, actually makes a warmer and more comfortable place in which a cow may bed down. However, to keep her clean, more bedding is required, as is revealed in the Wisconsin test comparing a run barn with a conventional dairy barn. Also the records show that in this test the labor requirement per cow does not greatly differ, one type of barn compared with the other.

Miles of walking with a milk bucket can be saved by having the milkhouse located handy to the milker in the cow stable. Whether the cows in the barn face in or out, provide a cross alley, if possible, into the milkhouse, and both on the same floor level.

The slop barrel still is standard equipment on many farms, but self-feeders save both labor and feed. The same goes for self-feeding western lambs. The biggest labor-saving arrangement with both is hogging-down or lambing-down standing corn in the field. Naturally self-feeders in the first case, and hog-tight or sheep-tight fences in the second case, are necessary. The electric fence here finds good use. Cattling-down corn has not become popular, but in the feed lot once-a-day feeding of grain to steers has been shown in Wisconsin to be just as efficient and profitable as twice-a-day feeding. Much effort can be saved by handy feed storage and use of gravity in distributing it wherever possible. This beats shoveling of grain, pitching hay or silage, or carrying them by hand. Watering devices likewise frequently can be made automatic, requiring the least looking after. An accumulation of manure in the lot, barn, or manure pit needs to be hauled out on the land and has always required considerable back work. But even here power machinery can be used effectively.

Improved Fertility Saves Water

Condensed from California Cultivator

R. E. Stephenson

THE importance of fertility in reducing the amount of water needed to make a unit of crop growth is illustrated by some greenhouse studies. Sunflower was used as the indicator plant on two different soils. Various fertilizer treatments were made. In one case in which treble superphosphate was used on two soils, yields were increased 50 per cent on one soil and tripled on the other. Tripling the yield cut to less than half the water needed to make a unit of growth. The soil which had the yield increase of 50 per cent had the water requirement reduced by more than one-third.

Another treatment provided liberal and complete fertilization, including nitrogen, phosphorus, potassium, sulphur, calcium, magnesium, and boron. This treatment increased the yield on both soils more than 14 times, and reduced the amount of water used to make a unit of growth to about one-sixth of that used by plants grown on the unfertilized soil.

A combinatoin of fertilizer and compost increased the yield still more and reduced the water consumption per pound of growth to the lowest level; 251 pounds on one soil and 218 pounds on the other. These data indicate a progressive improvement of the soil from different treatments, with increased yields and reduced water consumption per unit of plant production. Adequate moisture was supplied in all cases so that the availability of water was never a limiting factor.

Applying these results to field conditions, it may be possible to compensate for lack of moisture to an appreciable extent by improving the quality of the soil. This may be done not only by use of fertilizer but by growing legumes, cover cropping, manuring and similar accepted soil-improving practices. Drouth years may have less serious consequences as methods of providing favorable soil conditions are better appreciated and applied.

It has been observed that the poor, eroded slopes in the corn belt produced small corn with little grain in dry years and that the lower part of the stalk turned brown and died. The condition

Reprinted by permission from California Cultivator, Los Angeles, Calif., June 10, 1944

was called "firing" and was blamed on a lack of moisture. There is now definite information to indicate that both the burning and the low yield were due more to lack of fertility (especially a lack of available nitrogen) than to lack of moisture. The Indiana experiment station has demonstrated that where corn suffering from nitrogen deficiency would fire and produce less than 25 bushels an acre, the well-fertilized crop with sufficient nitrogen would show no trace of firing and yields were more than 50 bushels an acre.

In using commercial fertilizers for increasing crop production, the method of application has proved as important as the amount and kind of fertilizer employed. Once it was believed that fertilizers could not be safely used in dry season, that they burned the crop in dry weather. Now it is known that fertilizers of the right kind, properly used, may produce relatively greater benefit in the dry years, if not too severe, than when the moisture content is adequate. There is no intention, however, of implying that moisture is unimportant, even on the most fertile soils; both are necessary for maximum production.

Fertilizers, properly used, supply essential nutrients and stimulate root development. The increased root growth and deeper penetration enable the crop to withdraw more water from the soil. This, in a limited way, alleviates drouth severity. In a dry year, the top soil which normally supplies most of the nutrient, and is where the usual application of fertilizer is made, dries so completely that roots are unable to take nutrient from the soil. The process of nitrification may stop entirely and the crop starves for nitrogen. The harvest could not be otherwise than poor.

The most effective use of large applications of fertilizer demands reasonably deep plowing so that the material may be placed deeply to reach moist soil. There have been many reports of good results from plowsole application, which places the fertilizer in the bottom of the furrow behind the breaking plow. This method gets it down, and prevents much mixing of fertilizer and soil, thereby reducing fixation. The fertilizer rests upon moist soil where it goes into solution and becomes easily accessible to the roots. This deep placement enables the crop to absorb nutrient throughout most of the growing season. However, a light application of fertilizer in the row is helpful in most seasons for starting early growth quickly.

The importance of adequate amounts of nitrogen, which is the growth element without which

all other nutrients are rendered ineffective, is easily overlooked. Unlike the mineral elements, nitrogen is not supplied in appreciable amounts by the deep soil nor is it supplied to the crop by a dry top soil. The Indiana station found deep placement of nitrogen fertilizer very important, especially in the drier seasons and in the dry months of any season.

Effective fertilization demands the practice of methods of moisture conservation. Moisture is removed from the deep soil almost entirely by deep-rooted crops. In growing any crop where moisture conservation is important, all competing vegetation must be eliminated. Weeds are the principal competitors with commercial crops and no good farmer will tolerate them. But cover crops which are common in orchards, may become serious competitors for moisture. Where there is probability of moisture shortage, the cover crop should be worked down early enough to allow the soil to become filled with water to its capacity following elimination of the cover. Liberal fertilization of the cover crop helps to secure a desirable early growth so that, although worked down early, there is enough growth for effective humus renewal.

These are the established principles of water usage, soil fertility and crop production by which yields in many areas could be greatly increased. Sizable crops are being produced on good soils in dry areas, with half to one-third the rainfall normal to most regions of agricultural production without irrigation, and this in spite of the fact that most of the precipitation is outside of the regular growing season. The harvest depends upon getting the water into the soil where it is stored for future crop use, then sufficient fertility to enable the crop to make the most of its water supply without competition from weeds or other growth.

Salt Requirements of Livestock

Condensed from American Feed Trade

E. B. Tustin, Jr.

ALTHOUGH all feeders realize the necessity of salt for every type of stock, many do not realize that salt must be fed to the animal regularly, just as lubricating oil must be supplied consistently to a machine; otherwise, there is apt to be trouble.

Salt is continually being given off by the animal body. Horses put two grams of salt into every pound of perspiration. Cows put a gram of salt into every pint of milk, chickens, salt into their eggs and sheep, salt into their fleece. With this in mind, it is remarkable to note the benefits to be derived in promoting the health and development of stock from the proper use of salt.

Take chickens, for example. Agricultural station reports show that groups of poultry not receiving salt are characterized by poor growth, inefficient utilization of feed, increased susceptibility to disease, retarded sexual maturity and a decrease in the size of the eggs and the number of the eggs. For these reasons salt is included in prepared feeds; so a feed miller should add 1 lb. of fine salt, preferably iodized, to each 100 lb. of mash. One reason for iodized salt is to replace the iodin of the missing fishmeal these days.

If chickens become cannibalistic, a highly effective cure reported by the University of Wisconsin, is to provide extra salt by dissolving a tablespoonful of fine salt in one gal. of water. Give for a half day on three alternate days; for instance, a half day on Monday, Wednesday and Friday.

Of all classes of live stock, swine suffer the most from lack of salt. This is because their growth is so rapid and they are often raised without pasture. Very important savings in feed and time to mature results from mixing 2½ lb. of salt in every 100 lb. of the meal. Tests from a Canadian Experiment Station show that pigs fed 2½% salt produced 20% more gain than a check group given but 1% salt in the meal. Furthermore, judges said the fat and meat were harder in the more heavy salted pigs. Use a rather fine salt as it mixes more evenly.

Cows in milk, calves, rapidly growing heifers and pregnant

Reprinted by permission from American Feed Trade, Chicago, Illinois, Mar.-Apr., 1944

animals have a high salt requirement. Tests on 250 cows over a two-year period at the New York World's Fair showed they should have all the salt they want. A good practice is to mix 1 lb. of fine salt with each 100 lb. of grain feed and then provide extra salt free choice where cows can help themselves to what they want, as salt needs vary widely with individual cows.

Beef stock needs plenty of salt. The greater the proportion of roughage in the feed, the greater the amount of salt needed. Seeds and grass are low in sodium and chlorine. Roughages are all deficient in sodium. Salt, of course, is composed of sodium and chlorine and so will supply these elements. At the Kansas Station, on grass pasture steers consumed 1½ lb. of salt per month; on alfalfa hay 3 lb. per month, and on corn silage over 9 lb. per month. Salt that is made constantly available to live stock automatically takes care of their varying requirements. On the average, allow a minimum of 20 lb. of salt per year, per head. Change location of the salt blocks in the field occasionally to help equalize the grazing area.

Sheep and lambs have a higher salt requirement per pound of body weight than any other farm animal. This is due to the larger amount of roughage they eat and to the salt lost in perspiration. They should have salt in covered boxes moved over the grazing ground from time to time. Tests prove lambs should have ½ lb. of salt per month; ewes 1 lb. for fastest gains.

A reasonable allowance for a horse is about 2 oz. of salt per day or a little less than 1 lb. a week, as shown by tests at the Michigan Experimental Farm. The quantity needed varies with individual horses and with the season, increasing from May into September.

It is said that one of the most frequent causes of excessive loss in weight and fatigue in horses during the haying season is due to insufficient salt. When the weather is cooler and work and perspiration are less, the need for salt is less. Horses should have free access to salt at all times in pasture or paddock, so they can adjust their requirements to their needs. In many instances delicate eaters and shy drinkers will show an increased appetite when allowed free access to salt.

What Determines Farm Profit?

Condensed from Iowa Farm Economist

J. R. Bowring

FARM income in Iowa has risen sharply since 1939. But not all farmers have experienced an equal increase in income. Some have seen their profits expand much more than others. In an effort to learn some of the reasons why certain farmers have enjoyed a sharper income rise than their neighbors, we analyzed the farm records kept by 514 members of the Iowa Farm Business Associations during the period 1939-1942.

Of course, many factors affect the size of farm income. We chose five which we thought were likely to have had a relatively large influence on any changes in net farm income on these 514 farms during the years 1939 to 1942. These five factors are: The total pounds of meat produced, total crop acres, corn yield, man-work-units per man year, and total farm acres.

In other words we wanted to study the shifts these record-keeping farmers made in the size of their livestock enterprise, of their crop enterprise, in the amount of labor utilized, as well as the effect of changes in crop yields.

We used "man-work-units" as a common denominator to measure shifts in the use of labor on these farms. A man-work-unit represents the amount of work that a farmer can do in the average 10-hour day. For example, it requires about 10 hours to raise an acre of corn or 130 hours to take care of a milk cow for a year. Thus an acre of corn represents 1 man-work-unit, and a dairy cow, 13 man-work-units.

The questions to be answered were: Which of these factors had the most influence on farm income changes during the period 1939 to 1942, and what was their total importance?

Statistical analysis revealed that all told approximately 45 percent of the total variation in the rate of net income changes among these farmers was associated with these five factors. It further indicated that changes in total meat production came first in importance, then average total acres on the farm, and then change in total crop acres.

Shifts in man-work-units per man year apparently did not influence income changes greatly. No doubt this was caused by the

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adoption of labor-saving devices not previously used. Other studies have indicated that farm production has been expanded because farmers have worked longer and harder hours in place of using additional labor. If this is true, the relative influence of the labor factor may not show up in its true importance.

Some farmers, however, showed a much greater increase in net farm income than the changes in the five factors studied would lead one to expect. On the other hand, the net income of others among these farm record keepers increased considerably less than expected. To learn some of the reasons behind this we further examined the records and background of those farmers whose income varied considerably from the expected.

We found that most farmers whose net income increased at a rate greater than expected were men who had taken advantage of the rapid rise in prices of certain products. They shifted into the production of hogs at the beginning of the period studied. A few expanded turkey production. Many of them specialized in one of these enterprises.

Stepped-up production of the right products coupled with increased prices raised their net income. All of these men were considered good managers by those knowing them personally.

Most of those farmers whose changes in net income were less than expected were men who had not expanded their hog enterprise. Many were cattle feeders who preferred to stick to their regular cattle-feeding program or else expanded cattle feeding at expense of hogs. While 1942 may have been an exception, nevertheless, taken over the whole period, increased feed prices and operating expenses pulled the profit from feeding cattle below that earned in a comparable investment in hogs.

Several of these farmers were "high - cost" operators. That is they were men who accomplished their production with little regard to cost. If it occurs to them that they might need something, they go and buy it if they think they can afford it rather than determining if it is really necessary. This kind of an operator is often somewhat wasteful.

In the opinion of those who know these farmers personally a large proportion of this group lacked initiative or ability to change production practices with changes in relative prices.

On the other hand, those farmers whose net income changes showed little variation from that expected on the basis of the five factors studied were mainly known as "good steady farmers." Most of them made no heavy capital investment and did not

specialize in any one enterprise. Although they increased hog production some, these operators tended to be over-cautious in expanding operations. This leads one to believe that some may have been producing at less than their capacity during this period.

The fact that the five factors studied accounted for only 45 percent of the total variation in net farm income during the period 1939 to 1942 indicates a need for further analysis of factors net farm income during the period 1939 to 1942 indicates a need vironment of his farm, his financial condition, and his decisions as to the combination and size of his business undoubtedly are very important, as is indicated by the background of those farmers whose incomes varied from the expected in our study.

Our analysis indicated, however, that on these 514 Iowa Farm Business Association farms expanded livestock and crop production, combined with a rising price level were most important among the five factors studied in influencing changes in net farm income during the 1939 to 1942 period.

This study also illustrates that in periods of rapidly rising prices, farmers who make the greatest increases in profits are those who expand output sharply and also those who by good outlook or good "hunches" have accurate anticipation of prices. In such times profits increase more slowly for those who center their attention on increased efficiency. It is in normal times and especially in times of falling prices that efficiency is more important in determining farm profits.

Ideal One-Man Poultry Plant

Condensed from Poultry Tribune

G. T. Klein

Bob Sharples operates a one-man poultry plant of exceptional efficiency. Without help, he broods 5,000 chicks, keeps 2,000 layers six months of the year, 1,400 the remainder, sells hatching eggs, dresses some poultry for retail, and builds his own houses and equipment from lumber cut on his own farm. There is no help except what Mrs. Sharples can do in grading and packing hatching eggs.

Sharples isn't bragging about having surplus time on his hands. He is very busy, working long, hard hours. But there is something to show for it. A farm bought with but little down payment in 1937 was paid for in full in January, 1944. Now the plant has reached a good working size and the job for one man, while not easy, is not impossible.

The answer to why Sharples can run a plant of this size alone is in efficiency. As he works, he plans. Plans as to how steps can be saved and how hard work can be avoided are constantly in mind.

Every piece of water pipe has a float on it. There is no lugging of water. Adjoining every laying pen or brooder house is a feed storage room. Chicks are brooded in large units with gas brooders which are practically automatic in operation, and all feed is hauled to the range in trucks. That is why the plant is efficient.

Constantly Sharples is asking himself, "Is this egg candling table the right height? Does this feeder handle oats properly? How could litter be kept drier? Are these doors hung so that they can be entered with least trouble and without putting down a load of feed or eggs?"

When a change occurs to him, he is efficient enough and carpenter enough to stop then and there and do the job.

There are seven pens for New Hampshire breeders, each 24 ft. x 28 ft. and holding 200 birds plus the necessary Barred Rock males for producing "broiler cross" hatching eggs. The house is a combination of a remodeled barn and a new laying house built to match the barn. Pens have droppings pits, running water, large, dark front nests, and small, low feeders.

Feeding arrangements and the location of the feed room are particularly satisfactory on this

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farm. Bagged grain and mash is unloaded on the first floor and carried up one flight of stairs to the second story feed room by the grain man. On each floor are buttermilk barrels used for storing the feed supply and from which grain and mash can be dipped with pails. The bagged feed is stacked on the floor where it is handy for filling the barrels.

From the first floor barrels, feed is supplied layers in a basement room by means of a chute and a take-off. Feed is carried to the one attic or fourth floor pen in pails.

The feeding program is mash in hoppers all of the time, filled in the mornings. Grain is fed at the rate of two to three quarts a pen in the morning and ten pounds to 100 birds in late afternoon. The flock also has all the pellets it will eat in the late afternoon. Litter is changed but once a year, and pits are cleaned when they need it. Under the roosts is 1″ by 2″ heavy gauge wire. Night eggs are saved.

Twenty-five fowls are culled each week. These are sold at the farm, some dressed for retail customers and some to a man who dresses and retails. Production of the flock is held high by this culling. But to understand the culling program it is necessary to take a look at the chick brooding schedule.

There are two broods of 2,500 each booked for delivery February 7 and April 12. The brooder house is 24 feet in depth and it handles 600 pullet breeders from July 1 to January 1. This number, together with the 1,400 in the seven pens, gives a total of 2,000 females. By January 1, 600 must have been culled from all rooms, so that pens can be combined and the plant capacity then is 1,400 birds.

All eggs 23 ounces and larger go to a Delaware hatcheryman who produces broiler chicks. They are paid for on a premium basis above market and a bonus for hatchability above 75 percent. There is usually sale for hatching eggs the year round. It is typically a broiler hatching egg farm.

The houses have been built rat-proof. All pens have concrete floors. Laying pens have native white pine boards, building paper and shingles for sides. Brooder houses have been constructed especially for gas brooders, having two thicknesses of pine boards with paper between and covered with shingles. There is no place for rats to harbor and nest in this house, but a constant watch is kept for them.

Brooder houses are 24 feet in depth and divided into pens, each 16 ft. x 24 ft. A large size gas brooder handles 400 to 500 chicks in each pen. There is a partition through the center of each of the pens, dividing them into cool and

warm rooms. This partition consists of a 14-inch board at the bottom and canvas to the ceiling. This is very helpful in cold weather for gas brooders heat the rooms but very little. At four or five weeks the curtain is raised and the partition is no longer needed.

The only water on the plant that is not on a float is the water for the chicks. Two-quart fountains are used for three weeks. After that time, they have an automatic supply from a trough over a drain. Litter is shredded sugar cane which is not changed during the eight weeks that chicks are in the house.

Pullets are vaccinated for pox and laryngotracheitis and go to range at eight weeks. Shelters are 6 by 10 feet, with a low one-way roof. They house 125 birds. The shelters are built of native pine and are entirely too heavy to move by carrying. They are substantially built. Roosts with wire under are twelve inches from the ground.

The range has piped running water and float valves. Pullets are fed oats when available, and mash, both self fed. Corn is fed on the ground in the afternoon. The feeders handle grain in one and mash in the other. They were designed to hold one-half bag of mash and one 2-bushel bag of oats, and so constructed that either grain or mash feeds down freely. A hopper is tried until the right feeding space is found and then others are built like it. Sharples fills the feeders from a truck and prefers feeders which can be filled twice a week or perhaps every second day as needed.

The range has an excellent covering of native grass, and it supplies a considerable amount of feed. Feeders are moved every time they are filled. Waterers are washed daily.

February pullets are housed in the brooder house and in empty pens in the laying house in June. Hatching eggs are sold from them in the summer. By housing time for the April hatch, all hens have been sold and the plant is brought to full capacity by housing the new pullets.

Egg grading and packing often is a night job. There are a few pigs that eat garbage; and of course a garden. All work is interrupted occasionally by customers who drive to the farm to buy poultry or eggs. This interferes with the routine, but swells the income. All litter and droppings are sold to market gardeners who clean the pens and pits.

Breakdown of the Poultry Day

Feeding	½ hour
Watering	10 minutes
Egg Gathering	½ hour
Egg Grading	1½ hours
Brooding	1½ hours
Miscellaneous	7 hours

The Kitchshop

Condensed from The Nation's Agriculture

D. Howard Doane

Chairman of Board Doane Agricultural Service, Inc.

TODAY we are on the threshold of our third great period of advancing agriculture—farm and community processing.

Our forefathers were producers, processors, and merchandizers. They grew the grain and sold the flour or meal. They produced the cattle, slaughtered them, tanned the hides, and made and sold the shoes.

Farmers gradually gave up certain steps in processing and selling until today they are almost pure producers.

History shows that those closest to raw production are the poorest paid workers in any economy. This applies to the farmers of India, China, Europe or the United States. The history of the coal miners of England and the fishermen of the Northern countries all bear witness to the sad truth of this statement. Farmers of the United States are now largely producers of raw products.

Early American agriculture emphasized production — more production. Man's greatest benefactor was the one who made two blades of grass grow where one grew before.

Soon after World War I, we came to recognize that the handling and the cost of producing the two blades of grass was important. Our agricultural colleges began adding such subjects as farm management, economics, marketing, and finance. This represented the second phase of a gradually maturing agriculture.

As American farmers have relinquished, or had taken from them, more and more of the steps or processes beyond raw production they find that they have left only that portion of agriculture which relates to raw production. The inevitable is happening and we must suffer the consequences which follow. Many of the difficulties which our farmers faced from 1929, to the beginning of the present war, were a reflection of this growing tendency to leave for agriculture only production.

If the American economy is to survive and thrive it must start with a prosperous agriculture. Farmers can realize more income by: 1—Increasing prices; 2—In-

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creasing production; 3—Getting a larger proportion of the consumer's dollar.

One of the most disastrous things that could happen to us is to have prices increase to the point that non-agricultural products find competition increasingly easy. We have had a period of heavy gross production and it was this that brought about the government farm program of restricted production. It would appear that the most logical step for us to take at this time is to bring back to ourselves the first one or two steps beyond raw production so that we might increase our income without increasing cost to the consumer or force up the prices.

Let us consider for a moment those classes of processing which farmers can most effectively handle. They might be placed into three divisions: 1—Home Processing; 2—Farm Processing; and 3—Community Processing. We will discuss only the first in this article.

With the extension of electric lines, electric power will be available in an increasing number of farm homes. This gives to the farmer's wife an opportunity similar to that which her husband has had in replacing human muscles with mechanical power. Now the farm wife can bring to her assistance, power which will relieve her muscles and her back from many difficult and relatively heavy tasks. It will also make possible the development near, or in connection with, the farm home a series of processes which will add to the variety of foods for the home, increase their quality, and lower their cost.

Farmers have long had their work shops. Now the farm wife should have her processing shop. Suppose we call it the "Kitchshop." Here modern conveniences which relate to the processing of foods can all be done in a room specially constructed and equipped for the purpose. It would not be a part of the kitchen. It would not be used for preparing meals. It would not contain pots, pans, and gadgets for making meal preparation easier. The completely equipped Kitchshop would be used for the processing of a great variety of farm products and household needs. Of course, it would contain the electric freezing equipment now certain to be a part of many modern farm homes. New grinding equipment for making breakfast foods, flour, and meal would be available. Modern pressure cookers built as stationary equipment would cut the time necessary for canning and would facilitate and speed up all processes which need the application of heat for sterilizing, pasteurizing, and preserving. A built in hydraulic press would aid in

cheese making, preparation of meat loaf, extraction of juices from fruits and vegetables, and other similar jobs.

Soap making equipment and methods which would produce a product comparable with soap now purchased on the market would lighten that task and improve its quality.

Simple vinegar making equipment would be a further addition. Properly powered grinding and mixing machines for handling such products as sausage, meat loaves, and minced chicken would call for other types of equipment.

In many homes complete laundering equipment would be a part of the Kitchshop.

Not only would simplified, efficiently powered, equipment be available but all facilities and packaging necessary would also be a part of the equipment. If, for example, it was the housewife's desire to prepare flour, meal, and breakfast food, she might set aside two or three hours on a particular day for that purpose. As the product came from the new and modern mills, which are now appearing on the market, they would be put into moisture-proof packages, sealed and set away on the shelf, there occupying the same relative place that is now occupied by the products which are bought at retail from the city stores.

During butchering time in the winter, all facilities would be on hand for making a wide variety of meat products and either processing them for canning purposes or placing some of them in moisture-proof boxes to go into the deep freeze equipment.

Much has been written about keeping the boys on the farm. It is equally important that girls should desire to remain on farms. Their earning possibilities have been limited.

In the modern Kitchshop there will be an opportunity for the farm girl to create and prepare special recipes with modern equipment to be packaged in attractive cartons and made ready for sale to a discriminating trade. Here is her opportunity to create an earning in the field in which she is normally and rightfully interested.

Few of us who have endeavored to think these possibilities through have yet seen the end. There is much that can be done that has not yet reached even the realm of dreams. In her Kitchshop the farm wife will have equipment that is as efficient and modern as a tractor, combine, or cotton picker. She will do as good a job as the food processors with whom she may compete. She will have the incentive for lowering costs for products for her own table, and the profit incentive for those which she de-

sires to sell to a discriminating trade. Processing can be done at short intervals so that the products will be fresh. Modern power, modern refrigeration, modern heating, and modern air conditioning will all make their contribution to the comfort, convenience, and efficiency of the Kitchshop.

The whole subject of processing as it relates to the home, farm, and community is that new aspect of agriculture which must concern us more deeply, and to which we must give more careful consideration, if agriculture is to maintain its high level of income without creating artificial means for sustaining it.

Did a 5-Farm Clean-Up

The manure-hauling problem is solved on the Ernest Selle farm, Great Bend, with a $25 piece of equipment made from salvage. Mr. Selle took the transmission of a junked car, the steering gear unit of a tractor, some angle iron, his electric-welding outfit and built this labor-saving device.

A couple of weeks with the assistance of his brother and neighbor farmer, Egon Selle, they built a manure loader on the front of his tractor. It can be removed in 10 minutes with the loosening of a few bolts.

They then got three of their neighbors to bring their manure spreaders and tractors and in five days they had cleaned the lots and yards of the five farms, averaging well over 100 loads a day. Five loader scoops with at least seven feet headroom can be cleared easily with this loader.

The time and labor saved with this home-made equipment has well repaid Mr. Selle. The job was completed early before the heavy rains started, and it was done easily.

Mr. Selle has a fine registered herd of Angus cattle and raises wheat as a cash crop. He does a lot of community service, and now is President of the Barton County Farm Bureau and Commander of the Great Bend American Legion Post.—V. E. McAdams, County Agent, *Kansas Farmer*

Curing Hay on Tripods

Condensed from New England Homestead

C. L. Clevenger

A NUMBER of years ago the writer stopped off in Ontario, Canada, in quest of a good Yorkshire boar, and while looking at the pigs noticed that they were eating the greenest, leafiest alfalfa hay it had ever been his privilege to see east of the Mississippi River. Questions brought out the fact that it had been cured on tripods, a method quite new, and being rapidly accepted by the practical Canadians, who are excellent stock-men and ever on the alert for methods that will provide better feed for their animals.

It seemed to lend itself to New England conditions and that winter 150 tripods were put together. The next season proved to be a wet one and it was only through the use of the tripods that our first-cut clover and alfalfa crop were cured.

Tripods were made of three small poles 7 feet long, lightweight cedar preferred, 1½ - 2 inches in diameter, fastened together by boring a ⅜-inch hole through each stick 18 inches from the top end and inserting a heavy wire or a ¼-inch rod—anything that is strong and will permit bending the ends to hold the poles together. After fastening the poles together they are set up by spreading the legs to form a triangle and a single 20 - inch spike is driven in each pole on the outside corners, 18 inches from the ground to support three more similar poles, each resting on a spike at one end and the protruding pole on the other, forming a cross—or rather three crosses to support the first forks full of hay.

For best results with tripods the hay should be well wilted before being put on. In some instances it can be mowed in the forenoon and put on in the late afternoon, but it is safer to cut it one day and put it up the next. *Never put up hay with water on it.*

From 12 to 15 tripods per acre are required and they are easily distributed by piling the assembled tripods on one end of a hayrack and the cross poles on the other. A little experience will indicate where to drop them off.

By setting up the tripods and raking the hay to them much

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labor and time is saved. The first fork fulls are placed on the crosses as a base, and then all the hay possible is piled on them, making a pile 7 or 8 feet high. A little care is essential in topping out the cocks to make them shed rain as best it can be done. Once piled the essential part of the tripod curing comes into play—*forgetting about them.* This is very important. With average June weather they should remain untouched for ten days at the least, fourteen or fifteen are usually better.

After sufficient time has elapsed for the hay to become thoroughly cured and with all the leaves and color intact it is ready to be moved away. Reasonable care should be used to prevent shattering of the leaves and *do not under any circumstances* spread the hay out in the sun before hauling. This will dry it badly and greatly increase the shattering.

Having used tripods several years, we are thoroughly convinced that they are the means of putting up first-quality legume hay in the northeast, and the labor is not as great as first seems evident, as one handling does it and it is never necessary to shake out and repile hay.

Conditions we are facing indicate we will have to depend largely on home grown feed in the future and as hay is our largest crop it is up to us to harvest it in a manner that will put the greatest amount of protein in our hay mows and this is just what tripods enable us to do.

Science Remodels Sheep

Condensed from The Agricultural Situation

D. S. Burch

Agricultural Research Administration

ONE kind of remodeling—the kind dealing with living animals—need not wait for priorities on building material. The material is already at hand. Skillful breeders handle it with the master touch; others obtain the desired results only with some guidance. Acting as pattern makers for improved types of animals, scientists of the Department of Agriculture have cooperated with State Specialists and breeders in this field of modernization. The underlying purpose is to develop animals well adapted to the rapid pace of modern production by combining a maximum of desired characteristics.

By analyzing the breeding and production records of 1,622 ewes and their yearling daughters, scientists of the Bureau of Animal Industry in the Agricultural Research Administration estimated the extent to which fleece and body characteristics are inherited. The approximate degrees of heritability are: body weight, 40 percent; folds on the neck, 26 percent; length of staple (unstretched wool fibers), 36 percent; covering of wool on the face, 32 percent; weight of clean fleece, 38 percent; body type, 12 percent. These figures indicate that considerable progress in sheep improvement may be expected through selection for these characteristics.

Present range flocks of the West are composed principally of sheep that are intermixtures of several breeds, notably Rambouillets, Lincolns, and Cotswolds. As a result, most flocks of range sheep vary in body type and fleece characteristics which complicates both production and marketing problems.

In studies of the most desirable types of sheep for the western ranges, the animal scientists observed, among other things, great variation in the quantities of wool on the face and legs, and also in the prevalence of skin folds, especially about the neck and shoulders.

Contrary to former belief that an abundance of wool on the face

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and legs and a wrinkled skin all helped to make a heavier and more valuable fleece, actual tests, combined with marketing data, showed the opposite to be usually the case. Wool on the face and legs was so often short, stained, and dirty it was a liability rather than an asset.

Moreover, a heavy face covering created a so-called wool-blind condition; unless the wool was kept clipped from around the eyes, the sheep had difficulty in finding feed. Besides, wool-blind animals were more apt to be lost from the flock. Experience showed that some died from lowered resistance brought on by undernourishment and others fell victims to predatory animals. Tests also showed that, notwithstanding its larger area, a wrinkled skin produced no greater value of wool than a smooth skin. Sheep with large skin folds were also more difficult to shear than smooth-skinned animals.

So scientists set to work to remodel, virtually from head to foot, the sheep of flocks selected for experimentation at the Western Sheep Breeding Laboratory at Dubois, Idaho. As "building" material they selected breeding animals with smooth bodies, open faces, and other desirable characteristics such as vigor and prolificacy. This work has gone on for several years. Among the results obtained, ewes with open faces have produced and raised to weaning 12 percent more lambs than ewes with covered faces. The advantage in lamb production was 8.6 pounds per ewe per year, again in favor of the open-faced ewes.

As yearlings, ewes with open faces have weighed, on an average, about 5 pounds more than those with a heavy face covering. These benefits appeared to establish beyond doubt the economic evils, in sheep husbandry as elsewhere, of having wool pulled over the eyes.

Subsequent selection of breeding stock for open faces gave a greater proportion of offspring free from wool blindness. As a result of 1 year's breeding, the proportion of lambs with open faces at weaning time increased from 11 to 17 percent. Similarly the proportion of weaning lambs free from skinfolds increased from 72 to 84 percent. These findings are now being disseminated widely to range sheepmen.

Meanwhile, in addition to this beneficial modernizing trend, specialists of the Bureau of Animal Industry have been developing two new types of improved range sheep, almost literally built to order. One is called the Columbia, and many western sheepmen already are enthusiastic about it. It is the result of efforts to develop a crossbred sheep that will breed true to type and that

is adapted to western range areas, especially where there is an abundance of feed. The foundation breeding animals were principally selected Lincoln rams and Rambouillet ewes. Columbia sheep are large, vigorous, polled (without horns), and free from wool blindness and body wrinkles. The body is especially well fleshed in the loin, has well developed forequarters — indicating a strong constitution—and a good leg of mutton. Mature ewes produce about 12 pounds of unscoured wool a year, as compared with about 8 pounds for average sheep. The fleece of the new animal has the desirable quality of staying well together in storms. Columbia lambs grow rapidly and mature at an early age under good range conditions. Without receiving grain they average 80 pounds in weight at an age of about 130 days.

The other new range sheep is the Targhee, which derives its name from the Targhee National Forest west of Yellowstone Park. The Targhee is a medium-sized sheep produced by mating carefully selected animals of Rambouillet, Corriedale, and Lincoln breeding, with subsequent interbreeding of selected offspring. The inheritance of the Targhee is three-fourths of fine-wool sheep and one-fourth of long-wool sheep. This sheep is a resourceful grazing animal, able to subsist on medium-sparse ranges. The Targhee is highly adapted to a large area of the West. Its wool is finer than that of the Columbia but not so fine as the Rambouillet's. Targhee ewes are good mothers. They raise lambs that average about 80 pounds in weight at 140 days of age, on good range without grain.

As a service to eastern sheepmen, Department scientists are developing a still smaller type of sheep designed particularly for New England farm conditions. The chief object is to combine the good meat qualities of the Southdown and the wool qualities of the Corriedale. Efficiency in the use of feed and pasture is likewise sought. This work is in progress on the Department's farm near Middlebury, Vermont. The results have been encouraging and the investigators have already selected a name for the prospective breed — the Southdale.

Since this new model of sheep is small to medium in size, the legs of lamb and other cuts are of the relatively small size so much desired by many city consumers. The fleeces of mature ewes averaging about 7 pounds of attractive, light-shrinking, moderately fine wool of medium grade.

One of the novelties in scientific breeding, which also has a practical aspect, is the develop-

ment and multiplication of multi-nippled sheep—those with four or more nipples per ewe as compared with the normal number, two. A flock of 65 sheep having this character fairly well established was acquired in 1941. These animals were descendants of an original flock developed by Alexander Graham Bell, of telephone fame, who was interested in increasing the number of lambs per ewe and breeding into the flock the necessary number of nipples and sufficient milk flow for raising the extra lambs. The scientific studies now in progress deal with fixing, genetically, the multiple-birth and multi-nippled characteristics, with the view of increasing the production, per ewe, of both lamb meat and wool.

Still another field of study has been the improvement of Navajo sheep at the Department's Southwestern Range and Sheep Breeding Laboratory at Fort Wingate, N. Mex. Here the problems encountered are an outgrowth of the cultural habits and traditions of the people — now numbering about 50,000 Navajo Indians on a reservation of nearly 16 million acres. Their way of life is seminomadic and their economic welfare depends to a material degree on supplies of the proper type of wool for weaving into rugs and blankets.

The small yields of wool by old-type Navajo sheep — 1 to 2 pounds per animal — led their owners to try crossbreeding with Rambouillet and other rams, but the resulting offspring proved to be poorly adapted to the adverse range conditions, and their wool was not of the type desired for handicraft weaving. In cooperation with the Bureau of Indian Affairs of the Department of the Interior, scientists of the Department of Agriculture now seek to synthesize a new strain of Navajo sheep that can live on the desert ranges and that produce, in addition to mutton and lamb, weaving wool suitable for the native handicrafts. Progress to date has been encouraging, with prospects that the remodeling of Navajo sheep will increase the economic security of their Indian owners and at the same time preserve the distinctive Navajo art of weaving.

Facts About Vaccinating Poultry

Condensed from American Poultry Journal

A. E. Thompson

FOWL Pox and Infectious Laryngotracheitis are two diseases which cause heavy losses to poultry raisers every year, both of which can positively be prevented by vaccination.

Fowl Pox may strike a flock at any time, even though it has never been on the place before. It is caused by a filterable virus which may be carried to the flock in various ways, but probably most frequently by flies and mosquitoes. It is, therefore, more prevalent in the summer and fall months. Both chickens and turkeys are particularly susceptible to the disease.

There are two distinct forms of Pox—the dry or scab type, which affects the comb, wattles and unfeathered parts of the head, and the wet or diphtheritic type, which forms cankers inside the mouth and throat. Sometimes these two types are present at the same time. Fowl Pox, in either form, often results in the death of a large percentage of the flock, and always causes a drastic cut in egg production which may be as heavy as 50 to 100% for several weeks, resulting in the loss of a whole year's profit. One single outbreak in a good flock of layers often costs more in losses than the total cost of vaccinating pullets every year for 30 years.

Vaccination is a positive and inexpensive method of prevention and birds can be vaccinated at any time from one day old up to any age, but the ideal time is when they are 6 to 10 weeks old. There are two strains of Fowl Pox Vaccine — the "Chicken Strain" and the "Pigeon Strain." Both are equally effective in preventing fowl pox. The "Chicken Strain" should be used on young stock and flocks which are not in production and it gives a lifelong immunity. The "Pigeon Strain" is more mild in reaction, the immunity lasting for only a few weeks, and should only be used when necessary to vaccinate flocks in production.

There are two types of pox vaccine—the "Scab Origin" which is produced from pox scabs, and the "Embryo Origin" which is produced by inoculation of partially incubated eggs and the harvesting of the chorio-allantoic membrane which surrounds the chick's embryo. The embryo (or

Reprinted by permission from the American Poultry Journal, Chicago, Ill., June, 1944

egg propagated) type is preferred by most poultry authorities.

Infectious Largyngotracheitis, sometimes called infectious bronchitis, or tracheitis is a highly contagious virus disease of the respiratory tract of chickens, but it is not known to affect turkeys. This disease spreads rapidly in the flock, and is characterized by gasping, wheezing and choking. The death loss usually runs very high and birds which apparently recover remain carriers of the disease to the next year's crop of pullets. Birds under two months of age seldom are affected. This disease can be positively prevented by vaccination and birds may be vaccinated with both tracheitis vaccine and fowl pox vaccine at one handling. When vaccinating with either pox or tracheitis vaccine it is well to bear in mind that you are handling a live virus, and that unless previously vaccinated against these diseases, all birds on the place should be vaccinated or else completely isolated with separate attendants.

Bacterins are also becoming increasingly popular for building up resistance against such germ diseases as Fowl Cholera, Typhoid, Paratyphoid, and secondary invaders of colds, but should not be confused with true vaccines which confer a definite immunity. However, the increased resistance conferred by bacterins is of several weeks' duration, but should be repeated occasionally throughout the year.

Beat the Weeds for More Bushels

Condensed from Successful Farming

J. Brownlee Davidson

CORN requires rich soil, rich soil supports vigorous weeds, and vigorous weeds can only be destroyed by severe treatment. How and where and with what to apply that treatment has become something of an art with many Cornbelt farmers.

It is customary in this section to cultivate corn after planting, once or twice with a light implement like the harrow, the weeder, or the rotary hoe, and two to four times with a cultivator equipped with shovels or sweeps. It is not unusual to spend for cultivation one-third or more of the total labor and power used in growing the crop, which indicates just how important cultivation and weed control may be, especially with labor so scarce.

The attack on weeds which would grow in the cornfield and rob the corn plants of soil fertility and moisture should be ruthless and relentless. It is a question either of the destruction of weeds or of harvesting a smaller crop. In the early days when land was first brought into cultivation from the prairies, weed control was much more easily accomplished than at present. Botanists have observed that the number and distribution of many annual and perennial weeds grown in the fields has been rapidly increasing.

It is well not to overlook some of the means of controlling weeds, which should supplement cultivation. Of these, the prevention of seeding and the distribution of weed seed when the corn ground is in other crops of the rotation, are extremely important. However, this article deals primarily with the destruction of weeds by cultivation. The various ways by which this may be accomplished are: (1) covering the weeds with soil; (2) lifting the weeds out of the soil so the roots will dry; (3) cutting the aerial or above-ground portions free from the root system; and (4) stimulating the early germination of the weed seed, so that the weeds may be destroyed before planting.

The Iowa Experiment Station and the United States Department of Agriculture have been investigating over a number of years the labor, power, and ma-

Reprinted by permission from Successful Farming, Des Moines, Iowa, June, 1944

chines needed for growing corn. One important phase of these investigations has been the control of weeds. The following practices and findings are among the most important reported.

A practice followed quite generally by corn growers is to destroy weeds "in the white" with a light, wide cultivating implement which covers the whole area cultivated without regard to the rows in which the crop is planted.

Weed plants coming from small seeds are delicate and are easily destroyed shortly after germination just as they are coming thru the ground. A harrow or similar implement will drag these tender weed plants out of the ground, or break them up, thus destroying them effectively. The three implements commonly used for this kind of cultivation are the smoothing harrow, the weeder, and the rotary hoe. While each of these implements has its advocates, it is recognized that the weeder does its best work in light soils and where there is but little trash on or near the surface.

The rotary hoe is affected less by trash but does its best work on those soils which form a crust on the surface following a rain. The harrow is definitely limited to fields free from trash — and does a good job.

In using these implements it should be kept in mind that the principle of their use lies in the fact that the resistance of the corn plant to the cultivation given is greater than that of the weeds. Of course these light implements may be used after planting before the corn is up, but later the corn must be able to withstand the action of the teeth or hoes without serious injury. Much damage to the corn plants may be done if these cultivating implements are used just as the delicate corn sprouts are breaking thru the surface of the soil. And, of course, they have little or no iufluence on deep-rooted weeds which are as resistant to the cultivation as the corn plants.

By using a rotary-hoe attachment or rotary shields on the conventional corn cultivator having sweeps or shovels, it is possible to secure the advantages of the rotary hoe for early cultivation with little additional expense for machinery. With this combination it is possible to carry out the first cultivation at high speed, three to four miles per hour. The rotary hoe works best at reasonably high speeds.

It was found in the experiments cited that sweeps were better than pointed shovels for high-speed tractor cultivation. The shovels lift the soil so high that it falls on the corn plants. Sweeps wide enough for their tracks to overlap should be selected, so that all of the surface

between the rows will be thoroly cultivated. In our experience sweeps are much to be preferred over narrow shovels which do not cover the entire surface and make it possible for deep-rooted weeds to be missed.

The most difficult place to destroy weeds is near the corn plants. First-time cultivation which does not destroy these weeds is largely a waste of effort; the weeds in the middle space between the rows may be destroyed later.

Experiments have shown that an effective cultivation at the time the corn is eight to 10 inches high may give fairly good control without much further attention. Corn grows very rapidly after this time and quickly shades the ground. Once-over cultivation is not to be recommended, but the above experience illustrates the importance of thorough cultivation at the right time.

With wide, fast-moving tractor cultivators it is important that the equipment shall be as free as possible from clogging which results in poor work and lost time. The best cultivating device as far as freedom from clogging is concerned is the disk. When properly adjusted the disk will operate thru heavy trash or vines. The disk moves considerable soil and may produce undesirable ridges. Under conditions of excessive trash, two pairs of disks for each row may be used with the inside pair set to throw the soil away from corn plants during the first cultivation. When set to throw the soil toward the plants, deflectors may be used to prevent the soil lifted by the disks from falling on the corn. A disk hiller, the term usually given to a disk blade mounted on a shank, is a difficult device to adjust, not only on account of its action on the soil but also because of the heavy side thrust.

One of the most useful devices tried in the investigations described is the weeder attachment. This is mounted to the rear of the tractor and not only partially erases the tractor wheel tracks but also drags many of the weeds to the surface and frees them from the soil, assuring that they will not survive. The attachment is essentially a second cultivator. The tractor, since it is generally used for operations requiring more power than cultivating, has a surplus of power for cultivation.

The only purpose of check-rowing corn is to provide for cross-cultivation, an aid to the control of weeds in the row. In other respects drilled corn is to be preferred. With an increased interest in planting corn rows on the contour, which interferes with checking, weed control without cross-cultivation is of much interest. It has been demon-

strated that if weeds are destroyed in the row when small, reasonably good control can be secured. Thus it is important to destroy the weeds before the corn is thru the surface and again just as another crop of weeds is getting started.

Of course, weed control in listed corn is comparatively easy, because there is the opportunity of smothering the weeds as the lister furrow is filled with soil. The furrow also aids in the early cultivations in guiding the cultivator accurately on the row.

The increased interest on the part of farmers, manufacturers, and experiment station workers in weed control points definitely to improved practices in corn cultivation. It is a fair speculation to say that the possibilities of mechanical power for operating cultivating mechanisms have not been fully realized and that some outstanding developments are ahead.

Force Feeding

Getting hens to eat enough feed is the No. 1 job for high summer egg production. It's easy in April and May, but becomes increasingly difficult as hot weather comes.

One hundred Rhode Island Red hens that are laying 50 to 60 per cent need to eat about 30 pounds of feed a day. Leghorns can get by on two or three pounds less.

One method of "coaxing" hens to eat more is lighting, that is, turning the lights on around 3 A.M., and letting them burn until daylight. This stimulates feed consumption when it is cool. Three 40-watt bulbs with reflectors is the usual amount of light for a 24 ft. by 24 ft. pen. The lights need to be well distributed in the house. Both feed and water must be on hand for the flock in the morning.

Many poultry keepers like to feed about equal parts of grain and mash, but it can vary one way or the other. If the flock prefers more mash, let them have it; the important thing is to get heavy feed consumption. Feeding tests have repeatedly shown it isn't the proportion of grain and mash that counts, but rather the total amount.

Consumption usually increases when mash is moistened with milk or water. Pelleted feeds are easy for hens to eat, and their use frequently helps.

—*Farm Journal*

They Know Their Cows

Condensed from The Farmer

William H. Kircher

IF you want to know about a cow in any one of the good herds in the community that surrounds Truman, Minn., the chances are that you won't have to use your own judgment or take the owner's word about her.

Most of these good herds are under test in the Truman Co-operative Dairy Herd Improvement Association so you can refer to the cow's record. The story is all set down in black and white by J. Howard Beymer, tester, who knows by name all the cows in the 55 herds, their production records, and the records of their grandsires and granddams as well as their sires and dams.

During the last year the 661 cows under test averaged 352 pounds of butterfat, giving the group a standing of sixth place among the 59 associations in Minnesota. To learn how association members are using their records and how they are maintaining their high averages under ordinary farm conditions and twice-a-day milking we recently visited several of the owners with Mr. Beymer.

The herd of A. L. Kiester, of near Fairmont, showed a record which aroused our curiosity. Here is a herd which had made a 355-pound average in 1940, then jumped to 429.52 in 1941 and had held to near that point with 422.14 pounds in 1942 and 409.7 pounds in 1943. It was old Pabst Cascader, a bull owned by Mr. Kiester until 1939 that had left his mark on the herd. Several of his daughters had come into their first and second lactation periods in 1940 and that alone accounted for the jump. Without *records* Mr. Kiester would have known in a general way that his herd was doing better, but with them he knows how much better it is doing.

A cow in the Kiester herd that doesn't beat 300 pounds in her second lactation is culled, although a cow up to anywhere near the 300-pound mark is a good cow when it is considered that the average for all cows in Minnesota is less than 200 pounds.

However, there was one cow that wasn't taken out of the Kiester herd in spite of her production having been under 300 pounds her second year. She had produced 472 pounds her first period,

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was bred 60 days after freshening and then slumped to 270 pounds. The slump suggested giving her a reasonable rest so between her second and third periods she was not bred until four months after freshening, giving her 13 months between calves, and in succeeding periods she hasn't fallen below 500 pounds. *Records* revealed how important it was to give that animal a longer rest period.

Getting too concerned over a heifer's first period production may lead to some wrong conclusions, Mr. Kiester pointed out, referring to an experience with a heifer in his herd whose dam was a 500-pound cow. The first period record was a disappointment, then she improved considerably in her second period, and in the third began doing better than her dam had done.

"She was from a slow maturing family," said Mr. Kiester, "the kind that goes off to a slow start. They are long-lived animals, though, and much better than those that are good at the start and then taper off."

There was one cow in a herd under test that produced 500 pounds her first period, but never did that well again. *Records* revealed the long-lived, slow-maturing, profitable family, as well as the family whose daughters got off to a good start, then taper off."

The record of the Henry J. Schultz herd near Truman hit a four-year peak last year, but previously had been an up and down one. In 1940 the average was 346 pounds; in 1941 it jumped to 407 pounds; in 1942 it slumped to 329 pounds, and then made the jump to 419 pounds in 1943. Why? *Records* revealed in 1940 that some of the older cows should be culled, and the same thing was indicated by the record of 1942.

Cows in the Schultz herd averaging a pound or more butterfat a day get oil meal. The others don't. The grain they get now consists of 50% corn and cob meal and 50% oats. They are getting a good quality of alfalfa, and to save work they are given their full day's feed of hay in the morning. Hay consumption under this system of feeding averages about two tons per cow a year, which is not exorbitant. Records have not only told Mr. Schultz what cows in the herd are worthy of getting oil meal, and how changes in feeding affect them, but they also tell the story of returns on any investment he makes in equipment. For example there was the purchase of drinking cups some time ago. The first month after they were installed the cows showed their appreciation of having all the fresh water they wanted when they wanted it by producing $35

worth of butterfat more than they had produced the previous month.

The experience of Fred Quindel, St. James, is much the same as that of Mr. Kiester. The freshening of daughters of a good bull brought about a steady climb in production records. In 1940 his herd averaged 318 pounds of butterfat, in 1941 it went up to 358 pounds, in 1942 to 376 and last year to 435 pounds. All the while more and more of the daughters of Burke Ormsby Man-O-War were either freshening the first time, or coming into their second lactation period. Again, accurate records revealed what was happening in the herd.

And although these month to month, year to year records are just as valuable now as before the war, more and more associations are being forced to disband because of testers either going into other work or being drafted. Owners of some of these herds are continuing to test, doing the work themselves.

In South Dakota owners of several herds are testing, following a simple set of directions prepared by R. A. Cave, extension dairyman. They weigh the night and morning milk from each cow one day each month between the 12th and 18th, and record the weight on a milk record sheet which Mr. Cave also prepared. On alternate months they take samples of each cow's milk to the creamery where butterfat tests are made for them. In taking the sample for testing Mr. Cave suggests that the sample jar be half filled with the night's milk after the milk has been well stirred, then the balance of the jar be filled with the morning's milk after it, too, has been well stirred.

In computing milk and butterfat production, the weights of the night and morning milk are added, and multiplied by the number of days in the month to get the month's production. That figure then is multiplied by the butterfat test to get the month's butterfat production.

This owner testing lacks the advantage of being as convincing as testing by a disinterested person, but it does have the advantage of providing a month by month check on the herd so that when testing by a disinterested person is resumed, there be available an unbroken record of production.

Herd Bull Management

Condensed from The Shorthorn World

Dr. F. E. Walsh

Iowa State College, Ames, Iowa

IT is a well established fact that the degree of fertility in a herd of breeding cattle denotes the difference between success and failure in maintaining a profitable breeding unit.

There are many factors which have focused the attention of breeders and veterinarians alike on the proper management of both the sires and the female animals. The ability of a cow to produce a calf every 12 to 13 months is of such importance in breeding livestock that one can readily understand the necessity of considering measures to bring this about.

Properly kept records and clinical examination are necessary to establish the cause of disturbances in reproductive function and to establish the proper remedies. It is evident that there exist individual physiologic differences in the sex life of both male and female. These may or may not be hereditary. Some animals seem to be more susceptible to environmental influences which predispose to morbidity. These detrimental influences may not primarily affect the generative organs. Even though the involvement is secondary the general aptitude to fecundity has been disturbed or deleted entirely.

There must be kept in mind the more or less artificial conditions under which domestic animals are maintained and bred. Confusion may arise when there is failure to make distinction between disturbances which are caused by improper care, feeding, inflammatory and non-inflammatory processes in the appearance of specific and non-specific infectious diseases.

The selection of diversified feeds is important because it tends to avoid the absence of some necessary chemical ingredient which is essential to the normal function of the body. Attention should be given to the improvement and conservation of the desirable assimilable properties of forage plants such as mineral salts, vitamins, etc. We can expect some differences in the way some animals consume their food and the manner in which it is assimilated.

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The proper method to pursue in feeding a sire varies with different individuals. In the main he should be provided with good mixed hay, alfalfa, or clover, with sufficient grain to keep him healthy but not too fat. A limited amount of silage may also be fed to most bulls; however, too much silage or even too much hay may cause the bull to develop too much middle (abdominal cavity) and become clumsy and indifferent to cows even though they are properly in heat. The amount of roughage to be fed varies with the size and age of the bull. Some bulls become slow even on a small amount of roughage but as a rule bulls should be limited to 12 to 15 pounds per day. If silage is fed, a pound of hay can be displaced with three pounds of silage.

The amount of grain to be fed varies with different bulls — in most cases four to six pounds with good hay is ample. Protein need not be great. There have been those who have found it necessary to reduce all the food to a minimum in order to keep the bull active. In one case the bull was never allowed all the water he wished to consume until it was certain there were no cows in heat that day.

It is generally believed that a bull needs exercise to keep him vigorous and sexually active. A small pasture in which the grass is plentiful is most beneficial. In lieu of pasture grass, green plants should be cut and fed to the bull and exercise permitted in the dry lot.

The character of the ground in the dry lot is of importance. If it is low and wet or contains cinders or fine sand the soft structures of the feet may become injured. In cattle, the hind feet seem to be weaker than the front and therefore suffer more frequently. Of the two claws on each hind foot, the inner claw seems to suffer bruising more readily than the outer. One or all the claws may be injured if the animal is not properly cared for. The bruising varies markedly in severity and extent of tissues involved. Some remain comparatively free from infection and with proper treatment will heal rapidly. In others the infection becomes deep seated and extends to the bones, ligaments and tendons. Involvement of the deeper layers of the sole usually leads to necrosis and pus formation.

The primary cause is some mechanical injury due to fine cinders or sand which work their way through the soft structures of the foot. Other causes are unequal distribution of weight caused by abnormal growth of the claws, softening of the sole in stalled bulls or bulls whose feet are allowed to macerate in wet dirty stalls and pens. There is scarcely

any limit to the possible complications that may occur. In general, bulls with sore feet, especially the hind feet, will not serve cows. This can be avoided by confining him in the proper environment and keeping his feet properly trimmed.

Bulls with straight hocks tend to have puffy joints and many of their offspring will suffer from the same disturbance. If bulls with an exceptionally straight hock slip or fall from any cause, in some cases, it will injure not the hock joint but the stifle-joint. This results in a condition known as gonitis, which will heal unsatisfactorily. The bull will serve cows rather reluctantly, being more active in the hot months of the year and often refusing a cow entirely during the cold months. This condition can be avoided by managing the animal with due consideration of his environment.

We know that a bull may be fully sterile or fertile. It is also true that varying degrees of fertility may exist and this is an important point to keep in mind when buying a bull. A cow with a slight deviation from the normal reproductive tract may conceive when bred to a fully fertile bull; on the other hand may fail to conceive if the sire is of low fertility.

It requires but one sperm to fertilize an ovum but the chances of any one sperm passing to the ovarian end of the fallopian tubes at the right time is rather remote, therefore many thousands of sperms must be present in each 15 drops (one cc.) of semen before there can be any degree of certainty that pregnancy will occur. The normal bull ejaculates from 5-7 cc. of semen at each service. A bull of low fertility may, if he has had a sufficiently long rest period, produce a rather good sample of semen at one service, but if used at short intervals the sperm contents will be markedly reduced.

In addition to using this "exhaustion test," other measures should be used to determine the breeding ability and sexual health of the male. The best test of a male is his breeding record. All breeders should keep accurate records of each service of the bull.

The physical examination of the bull should never be omitted, but it must be remembered that it has its limitations. A clinician will note the presence of any abnormality which might interfere with the normal sex life. For example, inherited or acquired defects, abnormal form of the penis or of the testicles and other genital glands. A careful examination of the sire may prevent unfavorable results in the breeding herd by disclosing a disease condition which may lower his fertility.

In addition to reviewing the breeding records of the male and his clinical examination, the microscopic examination of the semen is of the greatest importance. Without perfect male cells normal reproductions will not occur. The frequency and the activity of the sperm in a fresh specimen of semen should be noted. If the sperms are non-motile or feebly motile, few in number or absent entirely, the bull is sterile. The frequency and motility of the sperm may be satisfactory but size, form and structure may be abnormal.

In order to get a clear picture of the individual sperm it is necessary to study stained specimens microscopically. This will reveal defects in size, shape, number present and the ratio of abnormal cells per hundred. To evaluate a bull successfully it is necessary to employ all known tests and this includes the breeding history of the cows to which he has been mated, because each test has its limitation, but if employed collectively the possible error will have been markedly reduced.

For the most part the various forms of infertility in the male may be classified in four categories:

1. Lack of sexual stimulations. The lack may be complete and permanent. The complete indifference may occur periodically. The manifestation may be due to overweight, heavy usage, too many services at an early age, under development of the testicles and old age.

2. Inability to serve a cow. This may be due to faulty conformation, diseases of various joints, too large abdominal development, improper feeding and care, etc.

3. Impotency. There may be a complete or reduced ability to impregnate a healthy female even though the male is physiolgically alert to sex stimulation and performs the act of sexual intercourse in a normal fashion. This defect is particularly serious in view of the fact that many months may pass before the breeder is aware of the impotency of his sire. This is especially true of a sire with a reduced potency. The causes may be of several sorts. At the present time a bull of a certain dairy breed under my supervision is unable to impregnate a female if he is used more frequently than every 10 to 15 days. The only detectable abnormal thing about this bull is his breeding history. Changes in the structure of the testicle and the sexual glands are also important factors.

4. Infectious agents. This heading could well be included in the above. However, under a separate heading it will serve well to point out the significance of micro-organisms and the role

they play in provoking injury to genital apparatus of breeding animals. A bull infected with micro-organisms may possess sexual vigor thereby endangering the sexual health of many females with which he copulates. Sterility in the cows often occurs from sexual contact with an infected bull; conversely an infected cow may infect a healthy bull. It has been shown that some disease-producing organisms do gain entrance to the genital glands and are discharged at the time of sexual intercourse. In many instances the fertility of the herd will become very low due to response of the tissues of the reproductive tract to the micro-organisms. The changes in the tissues may range from very slight deviation from the normal to those which will render the cow hopelessly sterile.

After a bull serves an infected cow, he himself may not become infected, but may become a mechanical carrier of the infection thereby introducing the organism into the next several cows he serves.

It is a good practice to irrigate the sheath of a bull a few hours before and immediately following service. Useful agents for this purpose are Lugol's or chlorine solution (0.5 percent).

To summarize, the capacity of a sire for service is modified by hereditable factors — age, nutritive supply and exercise. A common group of symptoms may be produced by a number of different causes. Every herd and every animal therein, presents its own individual problem which must be met and solved if a satisfactory herd is to be maintained.

Let's Consider Buckwheat

Condensed from Pennsylvania Farmer

J. B. R. Dickey

BUCKWHEAT and buckwheat growers have been the subject of more jokes than of serious consideration. A shortage of grain feed, however, whether individual, state or nation wide, is no joke. Buckwheat will produce grain, not as good grain as corn, but a fair substitute. What is more important, buckwheat will still make a crop when the season is too far gone for anything else. It is an emergency crop which can be put in in northern Pennsylvania when wet weather and wet fields have delayed operations until it is too late for corn and oats. It can also be used where a spring planted crop has failed. Farther south, with adequate moisture, it can if necessary follow an early harvested crop such as winter grain, hay or cannery peas. In fact two crops of buckwheat have been grown on the same field in the same season, though this is unconventional and not recommended.

Another thing in buckwheat's favor is its ability to use plant food largely unavailable to other crops and to make good yields, with a little fertilizer, on land too poor for anything else. This has led to its abuse as a poor land crop in a poor system of agriculture. Several succeeding crops of buckwheat in such a system will leave the land so poor that nothing will grow; and since it also leaves the soil loose and has a small root system serious erosion often follows. This is probably responsible for the idea that buckwheat is "hard on the land." In a proper rotation, with the next crop adequately fertilized, it is probably no harder on the land than other crops.

If as an emergency measure we must bring under cultivation many of the thousands of acres of land now idle largely because it is too poor and sour to produce profitably, buckwheat seems to be the best crop to start with. Its ability to grow on and to "tame down" wild land has long been appreciated, and with a little fertilizer good yields could be expected. In one fertilizer experiment on such land with buckwheat and soy beans, both without fertilizer produced only about 8 bushels per acre. With only 100 pounds of superphosphate the buckwheat yield went to about

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20 bushels; 200 of super pushed it up to about 25 bushels, and adding potash and nitrogen raised it to about 30. On the other hand, no fertilizer treatment raised the soy bean yield above the ten-bushel mark.

In the old days growing and harvesting buckwheat involved a lot of hours of man and horse labor, and if the crop was good it often lodged, which made a bad situation. Now most buckwheat is combined, which greatly reduces shattering and lodging losses, and eliminates most of the hand labor. Tractor power also makes it possible to plow, fit and drill large acreages in little time; and since both seeding and harvest come at entirely different seasons from other crops there is little conflict.

No one is liable to get rich growing buckwheat, and any one trying to run a buckwheat farm without a proper rotation would soon get into soil difficulties. It is interesting to note, however, that the average yield of buckwheat and of wheat for the state of Pennsylvania are both right around 19 bushels. The wheat is grown as a rule on the better farm land and the buckwheat on much of the poorest. The 1943 farm value of wheat was given as $1.53 per bushel and of buckwheat $1.23. With buckwheat figured at 48 pounds per bushel and wheat at 60, this is almost exactly the same value per pound. Twenty-five to 30-bushel yields of buckwheat are common with much more not at all unusual.

The most sensational recent development in buckwheat is the boom in Somerset and Cambria counties, Pennsylvania, during the past few years of Tartary, also known as rye buckwheat, duckwheat or hill billie buckwheat. It belongs to a different species from the common types, is much larger and more branching, sometimes five feet tall. Its leaves are a different shape and the inconspicuous flowers occur in the axils of the leaves along the stem, rather than nearly all on the top of the plant. Blooming, seed setting and ripening continues over a long period. The seeds are small, brown and roughened. Instead of sharp corners or wings they have creases. Millers cannot use Tartary buckwheat for flour since the meat does not readily separate from the hull and is reported to be slightly bitter. They object seriously to any mixture of this type with milling buckwheat. While somewhat lower in protein and total digestible nutrients than common buckwheat, according to the few analyses available, Tartary seems to be a satisfactory feed for cattle and poultry; some farmers think it even better.

Cambria and Somerset farmers

report 45 to 50 bushels of Tartary compared to 30 to 35 of common. They say it stands up better on fairly fertile soils and yields better than other buckwheat on low fertility land. It has been known and grown for years in a small way in other sections, but was never conspicuously popular. Perhaps the mountain counties have had several seasons which were particularly favorable for it, or perhaps it is especially adapted to this section. Other considerations may be that in the past buckwheat was grown primarily as a cash crop for milling purposes rather than as a feed. Or perhaps the big Tartary was hard to cut and handle before combines became common. It requires about two weeks longer to mature fully.

There are three sorts of common buckwheat. The most common, and probably the most satisfactory, is the Japanese which has rather large, black, winged seeds. Then there is the small grained, plumper silverhull, which is shiny gray and without wings on the corners. In between these is the common gray. All these cross fertilize and many crops are a mixture of black and gray. Some farmers think a mixture insures a better crop.

Much buckwheat is carelessly grown and might produce much more than it does. No one really knows much about it, and there is very little experimental evidence, but the following points are important.

1. The land should be plowed as long as possible before seeding and carefully fitted. The West Virginia Experiment Station found that early plowing added an average of 8.6 bushels to the yield. Especially when put on old sods or wild land, early plowing and proper fitting means drilling at a more uniform depth and the moisture needed for a quick come-up and a uniform stand. Seed which gets in too deep on heavy soil may never get up.

2. In the northern and mountain counties of Pennsylvania the common opinion is that ordinary buckwheat should be sown from about June 25th to July 5th with Tartary 10 to 14 days earlier. If the common type blooms during a hot, dry period, especially if the nights are also hot, the flowers are said to "blast" and the set of seed may be very light. Since the Tartary type sets its seed over a long period and may not be subject to blast, delaying seeding in order to have cooler weather may not be necessary with it. Some state that it may just as well be sown any time after the danger of spring frosts is past. At least ten weeks should be allowed before probable fall frosts for the common and 12 weeks for Tartary, since frost

kills the crop. In the southern counties much later sowing may be safe or even desirable for common buckwheat to provide suitable blooming weather. Too late sowing makes it more difficult to follow with a winter grain, as is desirable wherever possible in order to reduce winter washing and to fit the crop better into a rotation.

3. Fertilization is essential on most situations where buckwheat is apt to be grown. Phosphate is the most important element, and on fairly good soils 200 pounds of superphosphate is all that is needed. On poorer soils some potash, as in an 0-14-7, is advisable, and on very poor, sour situations a 3-12-6 may be profitable, though nitrogen has sometimes actually reduced yields and may increase the danger of lodging.

4. Only good clean seed of known viability should be sown. With the small seeded types such as Tartary and silverhull two to three pecks per acre is customary. The larger seeded black is often run up to four pecks or even more. Rather thin stands branch out and often produce about as well, and may stand up better, than thick stands, but they do not keep down weeds as well and may be harder to handle if cut and shocked.

5. When cured in shock cutting should start as soon as most of the grain is mature and before shattering starts. After 10 to 14 days of good weather in the shock buckwheat is ready to thresh. The straw of ripe buckwheat is very high in moisture and dries out very slowly so that barn storage either before or after threshing is seldom attempted. Combining is generally delayed until the grain is almost all ripe and most of the leaves have fallen. The combine should be operated only when the crop is as dry and free from dew as possible. Combined buckwheat should be held in bags with air space between them, turning occasionally if necessary until all danger of heating is past before it is stored in bulk. The combine leaves the straw spread on the field, which is the best place for it, since it has little value as feed or even as bedding.

Buckwheat is not satisfactory feed for hogs, but it may make up to 25% of rations for cattle. The analysis is somewhat like that of oats, but buckwheat lacks similar palatability and nutrient properties. For poultry it may make up a third of the scratch feed. An interesting development is the practice of some poultrymen of allowing chickens and turkeys to harvest buckwheat. The Tartary type has generally been used. An acre of it may furnish a considerable part of the feed of 150 pullets or at least 50 turkeys for about six weeks.

Any material increase in the buckwheat acreage will depend on an adequate supply of seed. There are no considerable outside sources and the local supply seldom equals the demand. To meet an emergency last year the buckwheat acreage was considerably increased. It would have been still larger if more seed had been available. Farmers who have stocks of fairly clean seed of good germination might well not feed it or sell it for milling until possible demands for sowing are known.

Water for Dairy Cows

Condensed from Farm Science

C. Y. Cannon

Iowa State College

DAIRYMEN whose cows can have a drink of water whenever they want it—night or day—will get more milk and butterfat from the same amount of feed and care than the dairymen who water their cows only a couple of times a day.

This is the conclusion we have drawn here at Iowa Station from experiments conducted several years ago. Dairymen who are "on their toes" know that the watering of cows is pretty important, for about 87 per cent of the milk which a cow gives is made from water.

In our tests we used two groups of cows. Those in one group were watered twice a day from an outdoor tank, while those in the other group were getting their water from water bowls beside them in the barn where they might drink at will.

In this test we used 12 cows, divided into two lots of six each. We used the experimental plan known as the double reversal. That is, each group of cows first was watered by one method for 28 days while the other group was being watered by the other method. At the end of one of the experimental periods, the method of watering the two groups was reversed and after a 7-day preliminary period, another 28-day period experiment was run. There were four of these 28-day periods. Thus each group

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of 6 cows was watered for two periods from the tank and two periods from bowls in the barn.

The cows while being watered by means of water bowls drank approximately 18 per cent more water and yielded 3.5 per cent more milk and 10.7 per cent more butterfat than while being watered twice a day at the outdoor tank.

A man was kept on the job to find out when the cows did their drinking if they had an opportunity to drink at will. We found that the cows drank an average of about 10 times in each 24 hours. About two-thirds of the water was consumed in the daytime—between 5 a.m. and 5 p.m. —and the other third during the night.

When the cows were being watered at the outside tank, they frequently drank only once a day. This refusal to drink *more* than once a day was distributed among all of the 12 cows, though we found that certain cows showed more of a tendency to drink but once per day than others. The inclination to drink but once per day was not consistently associated with the amount of milk produced.

One of the surprising results of these experiments was that the cows when watered by means of water bowls not only yielded more milk, but had a higher fat test. Why this was so we do not know, and we are not sure that it would be repeated in a similar trial, but a test of the data by mathematical procedure showed that there were only about 4 chances out of 100 that it was by accident alone.

In our tests we came to the conclusion that the temperature of the water was not nearly so important as the temperature of the air. In other words, if the cow had to stand outside in near zero weather, she was likely to drink relatively less regardless of the temperature of the water. As one might expect, the cows drank more as the weather became warmer.

Although the cows drank more from water bowls than when they were allowed to drink twice a day at an outside tank, there was less difference in milk production than in water consumption. The amount of water drunk from the bowls was 18 per cent more than from the outside tanks, but the milk yield was only 3.5 per cent more.

The fact that our experiments were made with water bowls doesn't mean we recommend that every dairyman supply his cows with water bowls. It is almost impossible during the war to obtain water bowls unless they are purchased second hand.

This doesn't mean that better watering is not possible on many farms. Some farmers have tanks

inside their barns where they might be able to water more than twice daily. Our experiments indicate that it is pretty important that the cow have a comfortable atmosphere where she drinks.

When cold wintry winds are wheezing around her, the cow is not likely to drink as much as she will if she can drink in a comfortable place. Though the air temperature in which the cow stands is important, she will drink more if she doesn't have to sip her needed water out of an icy tank.

The Iowa Station has shown that the type of ration which the cow is fed greatly influences the amount of water which she drinks. This same result has been shown in other experiments also. If the cow is getting silage or green feed with a lot of moisture in it, the cow will drink proportionately less than she will if she is entirely on dry feed. There is a tendency to balance up the total amount of water in the feed and that drunk. If the feed has more moisture in it, then the cow drinks that much less.

Do young calves on skimmilk need water? Some light on the answer to this question is given by an experiment conducted by the Idaho Station. There, a record was kept of the amount of water 26 Holstein calves drank, in addition to that which was in the milk they were fed. The amount of free water consumed weekly per calf was 1.8 pounds at 6 weeks of age, 29 pounds at 9 weeks, 48 pounds at 12 weeks, 62 pounds at 15 weeks, 88 pounds at 18 weeks, 146 pounds at 21 weeks and 234 pounds at 26 weeks of age.

These figures indicate that the very young calf does not need water in addition to the milk which it drinks. When the calf reaches the age of about 6 weeks, providing it with water then becomes essential. The amount which is needed increases rapidly as the calf gets older. Unless water is provided then and in amounts needed, the calves will not grow properly, nor will they maintain their best health.

Adequate watering of our dairy herds is just as important as the feeding. We need to make sure that it is properly done.

Mexico's Cattle Industry

Condensed from Agriculture in the Americas

Esther H. Johnson

Office of Foreign Agricultural Relations

ONE of the oldest cattle industries in the Western Hemisphere is that of Mexico. Cattle were first brought to Mexico in the early part of the sixteenth century, and although production trends have shown occasional severe reversals, the number on farms and ranches at present is estimated to be about 12 million head. The value of the annual calf crop is estimated roughly at $25,000,000 and so far as agriculture and livestock are concerned this value is exceeded only by the estimated value of annual corn production.

Before the discovery of America the only domesticated animals known to exist on the North American Continent were the turkey and the dog. Cattle were not indigenous to America but were brought here soon after its discovery by Columbus, who on his second voyage, in December 1493, brought some animals from the Spanish Peninsula to Santo Domingo. Although the exact time of the introduction of cattle into Mexico is not known, records show that Gregory Villalobos, then Captain General of Mexico, brought cattle over from Santo Domingo in 1521 and that later importations were made by Coronado, Onate, and Fray Marcos. The present city of Cuernavaca, meaning "Cowhorn," is located on the original ranch of that name established by Cortez with cattle brought from his ranch in Cuba.

The foundation stock of Mexico's cattle industry easily became adjusted to Mexico, where climate and topography resemble those of the Spanish Peninsula, their earlier home. On the broad unfenced grazing lands of Mexico they multiplied rapidly.

Wherever the Spanish went they wisely took livestock with them. Only a decade or so after Villalobos had brought cattle to Mexico, Coronado rounded up 500 head, in addition to thousands of sheep, goats and hogs, and took them with him on his search for the "seven golden cities of Cibola" in what is now New Mexico. These probably

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were the first cattle to enter the present area of the United States.

On the long trip northward through Mexico, Coronado left a number of animals along his route. Before the end of the sixteenth century thousands of cattle were reported as running wild in the States of Sinaloa, Durango and Chihuahua. These wild herds of cattle which roamed over the vast pasture lands of northern Mexico became the nucleus of the feeder cattle later to be exported to the United States.

During the Colonial period nearly all importations of cattle into Mexico were from the Spanish Peninsula but, later on, some importations were made from other European countries. Although the first Brown Swiss are said to have been imported back in 1870, only during the past 15 years have the larger importations of this breed been made. This breed is used mostly for dairy purposes but is favored along the hot coastal regions for beef production. Shorthorns were imported principally for milk at first but in 1874 importations for meat purposes were made into the State of Chihuahua. The first Herefords are said to have been brought in in 1876, the first Devonshires in 1879, Galloways in 1880, Dutch Belteds in 1882, and Brahmas in 1884. Red Polled cattle were introduced in 1910, and in 1928 Aberdeen Angus and Charolais, the French breed, were introduced. At the present time, nearly all the important breeds of the world have been introduced into Mexico. Records show, however, that only since 1920 have imports of good breeding stock been made on a fairly large scale.

The larger ranches in the northern part of the country produce most of the cattle that are exported to the United States, and livestock management practices here, quite naturally, are similar to those north of the Rio Grande. Because droughts are more prevalent in north-central Mexico than in other parts of the country, more pasture land is needed per animal; hence, the large acreage per ranch. Many of the ranches in northern Mexico contain 50,000 to 175,000 acres. The number of cattle on each ranch varies from 400 to 10,000 head.

Most of the cattle that graze on Mexico's northern range lands are of the beef type and have been bred up through the use of purebred bulls, principally Herefords. Current estimates are that 60 percent of the cattle in the States of Chihuahua and Sonora are practically purebred Herefords. The owners of many of these northern ranches originally came from the United States or have spent considerable time in the United States, thus be-

coming familiar with breeding practices here and the qualities desired by the United States market.

On many ranches definite breeding and management programs are followed. Calves are usually dropped in February, March, and April. Some of them are vaccinated when they are only a few weeks old; all dehorning, castrating, branding, and vaccinating usually takes place before fall. Then, by early winter and spring they are ready for export as feeder cattle. In order to carry out such a controlled breeding program, ranches are fenced and the bulls kept separate during certain months. On some of the better ranches even the female cattle of different ages are kept separate.

Pasture for cattle in Mexico varies from luxuriant cultivated grasses to the more or less woody types of vegetation. The grama grasses comprise the most important native forage but numerous other types are also found. One of the most important shrubs and dry-climate plants is mesquite. During the dry season some cattle get their entire nourishment from mesquite and similar plants. Although the number of pasture acres required per head varies in different parts of Mexico, the usual carrying capacity of much of the land in the central and northern parts of the country is one head on 10 acres or more.

During the past 5 years, from one-fifth to one-fourth of all cattle produced in Mexico have been exported, largely to the United States. The customary practice in carrying on this export trade is for the ranchers in the northern part of the country to maintain contacts with prospective buyers in the United States, who look to these ranchers for cattle supplies. Smaller producers often sell to special buyers who make a business of buying the stock from the smaller ranches. These buyers assume the responsibility of transporting the cattle across the border and selling them to United States buyers.

The man who sells cattle in export trade must obtain certain documents and permits from the Mexican authorities before shipment is made. When the cattle arrive at the border they are inspected by both Mexican and United States veterinarians. If the animals are found to warrant a clean bill of health, the animals must be dipped in a solution of lime sulphur. If they have fever ticks or come from an infested area, they are dipped, before entry, in an arsenical solution.

A customhouse inspector checks the number of cattle at the border and makes out appropriate forms for paying the customs charges, including inspection fees, export tax, etc. The customs broker pays

the expenses, after which a certificate for passing the cattle across the border is issued by the Mexican customs officials. As soon as the cattle have been driven on foot or transported by rail across the border, as the case may be, a United States customs broker takes charge of them. If considered necessary by the United States veterinarian inspectors, the animals are dipped again on this side.

Cattle are imported from Mexico under two types of entry, known in the vernacular of the industry as consumption entry, and bonded entry. Under the so-called consumption entry a consumption-entry bond must be posted with the customs officials when the cattle are entered. This bond is based on the value of the cattle plus the duty and serves as a guarantee against any irregularities in weight or other matters pertaining to entry.

Under a bonded, or warehouse, entry a bond is posted with the customhouse amounting to twice the amount of the duty and, regardless of when paid, is based on weight at the time of entry. Under this arrangement the cattle can be put in a bonded pasture for as long as 3 years. If an owner wants to sell some cattle from this bonded pasture, he can do so by paying the required duty. Before the cattle are sold, however, they must be inspected again and counted by customs inspectors, which procedure is required also when cattle are transferred from one bonded pasture to another.

The bulk of Mexican cattle entering the United States are young male animals, usually between 1 and 2 years of age and weighing between 200 and 700 pounds. The exportation of female stock has been discouraged for some time by the imposition of an export tax of $4.12 a head for females less than 6 years old.

High prices in the United States, the agreement of January 31, 1943, reducing the U. S. import duty on all cattle, and the increased wartime demand for beef resulted in a greatly accelerated movement of cattle across the border in the first 6 months of 1943. Some even came from the central states which normally supply Mexico City. In an effort to slow down this movement the Mexican Government in June 1943 imposed an export quota of 500,000 head for that calendar year. This quantity, however, is not greatly different from normal exports, the 1938-42 annual average being about 465,000 head. An announcement from Mexico City on December 25, 1943, stated that the quota of 500,000 would again apply in 1944.

Cattle for Mexico's domestic market are produced on a wide variety of farms and ranches, by

people living in towns and villages, and by "*ejidos*," which in Mexico are agrarian communities each consisting of 20 or more individuals to whom the Government has given limited ownership of land.

On most of the ranches in the central, southern, and coastal regions the cattle are raised and fattened on the same ranch. This is not true in the Huasteca area, where pasture is more abundant than in any other part of Mexico. On the better land of this area only 1 to 1½ acres are required per cow. A common practice is to purchase 2- to 4-year-old cattle in other areas and bring them to this rich pasture for fattening for a period of 6 months to a year.

About 25 percent of Mexico's cattle are produced on *ejidos* and are mostly of the so-called *corriente* (common) or *criollo* (native) type. Some progress is being made to breed these cattle up by the use of Brahma bulls. At the present time the *Nueva Italia Ejido*, one of the larger *ejidos* in Mexico, uses 20 purebred Brahma bulls because this breed is more resistant to the fever tick than other breeds.

The Horse and The Law

Condensed from The Horse

Harry Hibschman, LL.D.

"IT is a mistake," said the Hon. George M. Young, of the United States Customs Court, in 1928, "to believe that all horse dealers are horse traders. Horse traders are born, not made. Horse trading is an art. It is not a vocation. It is an avocation. To the genuine horse trader, a horse trade is a diversion, and he can get more pleasure out of it than out of a trip to Europe."

Then, as showing that the art is not yet lost to humanity, the court paid this tribute to a member of the horse trading fraternity: "The facts disclosed mark the Canadian as a past master in the horse trading profession. He purchased a horse from an American for $75.00 and sold him to another American for $725.00. That establishes his reputation for all time."

In the long ago, naturally, the horse cases that most commonly came before the courts were cases growing out of the exercise of this honorable avocation, though it was seldom that its regular addicts were parties to such litigation. For, if they found themselves outsmarted in a deal, they disdained to turn to the law for redress. They bore their losses, instead, with outward grace and with an inward resolve to bide their time until some day they had a chance to wreak their revenge in another trade. Nor were they often haled into court as defendants, for the reason that, like David Harum, they always kept in mind the distinction between "gospel truth" and "jury truth."

Horse trades and horse sales—and a horse trade is nothing but a double sale—do, of course, still take place; and, on the whole, they are governed by the same rules that apply to other transactions involving personal property. Hence, fraud vitiates a horse trade and justifies the injured party in cancelling the deal or in suing for damages, though the old maxim, *caveat emptor,* "let the buyer beware," applies with peculiar force to horse trades, at least with laymen. And not every untrue statement made in the course of a swapping match constitutes fraud as a matter of law. The Supreme Court of Iowa, for instance, declared it to be a mere "expression of opinion" for the seller of a stallion to assure the buyer that the horse "would not produce sorrel colts."

In order to be the basis of a

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suit a representation must have been made with intent to deceive, must have been false and known to be so, and must have been acted upon by the party complaining. So, if the latter acted on his own judgment and not upon the alleged false representation, he cannot take advantage of that representation. To take a typical case: A number of years ago I had a horse-trader client by the name of Hank Wilson, and he traded horses one day with a farmer by the name of Collins, a loud-mouthed fellow upon whom had been bestowed the name "Windy." Wilson deliberately assured Windy that the horse he was trading was "as sound as a dollar and without a blemish on him," though the horse was in fact as deaf as a post. Windy prided himself on his prowess as a horse trader and immediately after the deal was completed went around bragging, "Hank didn't put anything over on me. I wouldn't believe a darn word he said in a horse trade if he swore it on a stack of Bibles as high as Old Baldy. When I trade with him I use my own judgment, and I'm as smart as he is any day in the week." Soon discovering that communication with his new horse was somewhat difficult, he made the mistake of going to law. For we showed how he had boasted of relying on his own judgment in the deal, and on the strength of that his case was promptly thown out of court.

However, horse trading cases do not make up the large proportion of horse cases that they once did. In fact, the Wisconsin Supreme Court bemoaned the fact, eleven years ago, that the case then before it was "likely to be the last or one of the last times that the vanishing figure of the horse" would be "stamped upon the dreary pages" of its reports. Happily or otherwise, its fears in that regard have proven groundless, for the horse and his master still do find their way into the courts, bringing for settlement many of the same old questions that have always demanded attention and in addition many new ones peculiar to the age in which we live. Thus, within the last year, the Texas Court of Appeals has been called upon to decide the status of "a one-eyed mare, prone to spend her off nights prowling through the city, feasting upon the lawns, shrubbery, and gardens of her neighbors"; the New Jersey Court of Errors and Appeals has had before it a case involving the death of a school-boy from the kick of a horse; and the highest court of Massachusetts has had its time taken up with a case growing out of a collision between a horse and an automobile.

With respect to the trespass-

ing horse, it may be noted that there is this difference between it and a trespassing dog or cat: In the case of the latter, except where changed by statute, the ordinary rule is that, in order to be held liable for injuries inflicted by the animal, its owner must have what the law calls scienter, that is, knowledge of the propensity of the particular animal to trespass and to do mischief while trespassing; but no such scienter is necessary in the case of a trespassing horse. The owner of the latter is liable without specific knowledge of the horse's inclination to do mischief. If his horse escapes from the home close and breaks into a neighbor's pasture and there injures another horse, he is liable for the damages regardless of whether or not he had any knowledge of the viciousness of his horse under such circumstances. As the Supreme Judicial Court of Maine said a number of years ago, "The owner of domestic animals, if they are wrongfully in the place where they do any mischief, is liable for it though he had no notice that they had been accustomed to do so before. The ground of the action is that the animals were wrongfully in the place where the injury was done."

As to the liability of the owner of a horse in a case like the New Jersey case mentioned above, he is accountable only if he had that scienter which is not considered in trespassing cases and if, in addition, he was negligent. In the case referred to, the defendant was delivering wood to a country school building with a wagon drawn by a team of horses; and, while he was on the wagon unloading, a ten-year old boy sidled up to one of the horses unobserved and was kicked in the stomach with such force that he died from the injury. The court held in accordance with the great weight of authority that there could be no recovery under the circumstances in the absence of evidence showing that the horse had previously given signs of being vicious and that the owner had knowledge of the fact.

The rule is different where the horse inflicting the injury is running at large contrary to a local ordinance or state law. In such a case, as the Supreme Court of Mississippi held in 1932, where a child had been kicked by a stray horse, the owner of the horse is liable regardless of the previous good reputation of the horse.

The Massachusetts automobile case already mentioned was one in which the owner of the car had sued for damages resulting from its being run into by the defendant's horse. The horse, according to the evidence, was being driven by the defendant's twelve-year old boy when, hearing the whistle

of an approaching locomotive, it became scared, ran away, pulled loose from the wagon to which it had been attached, and ended up in the plaintiff's car. The court ruled that under these facts it was unnecessary to show any previous propensity on the part of the horse to run away, as the defendant had been guilty of negligence in entrusting the horse to an incompetent driver and was responsible for the ensuing damages.

As to the relative rights of the automobile and the horse, whether on a country road or on a city street, it may be said that, while there are statutes in most states prohibiting the owners of horses from letting them run at large, it is not unlawful to lead or drive them along a public highway, even at night, and the operator of an automobile must use reasonable care to avoid running into or injuring them under such conditions. Nor need the animals or the persons attending them carry a light, in the absence of a statute to that effect. On the other hand, where the statute provides that livestock on a highway shall be in care of some person and horses are permitted to run at large on a public road without control or supervision, a motorist who runs into them cannot be held liable for the resulting damages. In fact the liability may be the other way around, and the owner of the automobile may be able to recover from the owner of the horses for any injuries to his car or to himself.

Most of the early litigation between horse-owners and car-owners, quite naturally, resulted from the frightening of the horses by the appearance of the automobiles on the public streets and highways. And many stringent regulations were passed to protect the owners of horses against the snorting, new-fangled, mechanical monsters, it being provided in some instances that no one could drive a horseless carriage through a city or town without giving advance notice of his intention so to do or without being preceded by a man on foot carrying a red flag. We can laugh now at such legislative effusions; but horses do still take fright occasionally at the sight of automobiles, and it is still pertinent to inquire into the rights and duties of motorists in such cases.

To put it in a few words, the operator of an automobile must use such care as is reasonable under the particular circumstances to avoid frightening a horse. Hence, if there is nothing unusual about the appearance of his car, if it does not make any unusual noise, and if he drives it with proper regard for the rights of others, he is not liable if a horse becomes frightened by his

machine and runs away, unless he could have avoided the accident by slowing down or stopping.

On the other hand, the driver of an automobile is liable if there is something about his vehicle that may well be expected to scare a horse, as, for instance, flapping curtains or a streaming tarpaulin. And, if he sees or ought to see, that he is frightening a horse and that for him to proceed may make the animal unmanageable and cause an accident, it is his duty to stop his car and to do all that he can for the safety of the driver of the horse-drawn vehicle.

This requirement to stop is now a matter of statutory enactment in most of the states; but independently of that, it is the motorist's duty to stop, if that is necessary to prevent an accident. As in every other situation, it is the duty of the motorist to exercise such care as seems called for by the particular circumstances, and, if he fails to do that, he is responsible for the natural and probable results of his delinquency. But he is not liable for an extraordinary result, such, for example, as was involved in a case that came before the Iowa Supreme Court some years ago, where it was alleged that a horse had died of fright without coming in contact with the defendant's machine but because of a ruptured blood-vessel in the brain. Said the court of that claim, "Although possessed of the most vivid imagination, one could hardly anticipate such results as are said to have followed from the fright of this horse. It was such an unusual occurrence that the law will not consider it the proximate result of the alleged negligence."

In our day a common kind of action growing out of transactions involving horses is the action brought by would-be riders and amateur riders who are hurt while learning or while riding horses hired from a riding school. At least half a dozen such cases reached the appellate courts last year. The rule applicable in such litigation is the rule laid down long ago in livery stable cases, namely, that the person who hires out a horse must "furnish a reasonably safe animal for the purpose for which it is intended to be used." Thus, in a California case decided last August the plaintiff was a young girl who had hired a horse from a riding school and who had been thrown off when the horse had unexpectedly jumped. "Ordinary care is the test to be used," said the court, and refused to reverse the judgment of the lower court absolving the defendant from liability. And in an Ohio case in which a woman rider had recovered a judgment for $15,000 against a

riding academy for injuries sustained when a horse she had hired from the defendant had run away and fallen, the Supreme Court of that state held that no negligence had been proven and reversed the judgment, saying, "The record is totally silent as to this horse's previous behavior. There is no evidence that the defendant had any knowledge of any trait or propensity in the horse that might lead to the injury complained of." Then it held further, "One who engages in an enterprise of amusement or exercise or sport, such as horseback riding, must be taken to have incurred the normal risks," which is the general rule with reference to all sports. Similarly there is no liability on the part of the owner of the horse if the party hiring the horse knows of any objectionable traits in the horse or is warned of them and still insists on taking the animal. In that event he assumes extraordinary as well as ordinary risks incidental to horseback riding.

As horse-racing has always been one of our most popular sports, it is to be expected that many interesting cases would have had their origin on the racetrack. One of the oldest and most novel of these was an Illinois case in which the owner of a thoroughbred stallion named *Wolverton* sued the owner of a mare named *Belle of Nelson,* alleging that the stallion and the mare had been entered with seven other horses in a race, that the rider of the mare had so ridden her as to foul the stallion, and that as a result the stallion had been thrown and killed. The trial judge in charging the jury stated the law to be as follows: "The owner of a horse starting in a race must be presumed to have taken all the risks incidental to the race. But if a horse is intentionally fouled, if it is purposely run against or interfered with by the rider of another horse, the employer of the rider who so fouls him or interferes with him is liable for damages." Under these instructions and the evidences the jury brought in a verdict in favor of the owner of *Wolverton* for the full value of the horse.

As to a rider or driver in a race, the general rule is that it is negligence to permit a dangerous horse to take part in a race and that the person or association conducting the race is liable for any injuries to a participant in the race caused or inflicted by such a horse. It is similarly liable for permitting an obstruction on the track to the damage of a rider or driver. Thus, where an agricultural association, conducting a state fair, induced a woman to ride a horse in a running race and permitted a horse to be en-

tered that was vicious and in the habit of bolting from the track and the horse did so bolt and injure the woman rider, the Supreme Court of Minnesota held that the association was liable; and the Indiana Court of Appeals similarly held a fair association liable where there was a collision between two drivers of trotting horses, resulting in the death of one of the horses, because the association had permitted the spectators to surge upon the track, thus leaving insufficient room for the two drivers to pass.

As to patrons and spectators, societies or associations conducting races must furnish a safe place for them or be liable for any injuries suffered by any of them from a bolting or runaway horse or because the track was not properly fenced. They are not liable, however, to a patron or spectator who is out in the field or along the track when injured, if they have provided a proper and safe grandstand which he has failed to occupy.

An interesting question that arises once in a while is whether or not the owner of a runaway horse is liable to one who is hurt while attempting to stop it. The courts have uniformly held with reference to such cases that the liability of the owner depends upon whether or not there was imminent danger of injury to other persons, particularly to women and children on a busy street. Where there is such danger, the man who is brave enough to risk his life and limbs is justified, though his act verges on recklessness, and can recover from the owner of the horse if he is injured.

Finally, it may be noted that defamation of a horse does not justify an assault and battery upon the defamer by the owner of the horse. In such a case, where the victim of the assault brought suit for damages and the defendant set up the alleged slander of his horse as a defense, the Supreme Court of Minnesota refused to concede that that constituted a good defense, even though the aspersions were cast on the horse in the village store in the presence of a number of witnesses. Said the court: "Whichever version of plaintiff's remark—'a thing of a horse' or 'the damndest looking horse'—be adopted, the language contains nothing whatever to prompt a person possessed of ordinary common sense and judgment to commit a breach of the peace. The most that can be said of it is that it was disrespectful to the horse; but the horse was not present, and there was no horse trade on."

Meet Kikuyu Grass

Condensed from Pacific Rural Press

Alan A. Beetle

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LIKE the plant, the name Kikuyu comes from Africa, a region that has contributed many grasses already well known to Californians, such as Rhodes, Teff, and Napier. Of value either as forage or ground cover and possessing the valuable qualities of high nutritive value, palatability, vigorous, aggressive growth and drought resistance, kikuyu is worthy of war-time attention.

Pennisetum clandestinum, as the scientists call it, is a sturdy, prostrate perennial grass producing a thick mat of runners, both above and below the ground. The close, rapid growth chokes out weeds. Sprigs planted three feet apart will cover the ground in a single season. It is thus of considerable value for cleaning dirty land. Since its roots are not deeply penetrating as in Bermuda and Quack Grass it may be easily destroyed by plowing in dry seasons. A few hours in the sun kills the broken stems.

The inconspicuous flowers of kikuyu occur in the axils of the leaves and are hard to find. Seeds are a rarity. Thus the grass is established by planting runners. Propagation is easy in almost any type of soil, and once established there is no particular water requirement. Lots of moisture gives a lush succulent growth, especially in warm weather. However, well-rooted kikuyu is very drought resistant, maintaining a green cover through the hot summer months with little or no watering. Then its slow growth requires little cutting. Its susceptibility to frost in winter is heightened by cutting, but since, like Bermuda, it is dormant in winter, it will usually require no mowing.

Although not as pretty in a lawn as the bents or bluegrass, kikuyu can be relied on to penetrate the hard-packed soils and stand the heavy trampling of play grounds. It will bind the soil on new road cuts, and is easily established in parking strips and driveways.

Aside from its adaptability for lawns, kikuyu should be consid-

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ered a pasture grass for coast ranges where its summer growth prolongs the green feed period. Analysis on a water-free basis shows protein 17.94; fat, 1.74; fiber, 46.47; starch, sugar, etc., 26.94; and ash, 7.32.

Kikuyu is now being widely used for lawns in the San Francisco Bay area. It has been grown successfully for many years both at Berkeley and at Davis by the Division of Agronomy, University of California. How much farther northward it can be grown is not known. The grass is deserving of wider planting on bare areas in play grounds, around factories to keep down the dust, and on the poorer pasture lands.

Pink Eye

Condensed from The Cattleman

Dr. E. A. Grist

Chief Veterinarian, Livestock Sanitary Commission of Texas

INFLAMMATORY conditions of the eyes of cattle are referred to medically as ophthalmia, conjunctivitis, and keratitis, the term used depending somewhat on the parts of the eye involved or the extent of the inflammation.

Pink Eye has become the byword of the livestock raiser in describing any abnormal conditions of the eye. Many of these abnormal conditions may be attributed to other causes.

However, this discussion will be limited to the infectious type of Pink Eye. At the present time a great deal of work is being done to determine the actual causes.

Present knowledge indicates several organisms associated with this disease, the pyogenic or pus-producing group, such as Staphylococci, and Streptococci, Hay Bacillus and organism of the Hemorrhagic Septicemia group. It has been difficult to incriminate any particular organism as the specific causative agent.

Available evidence as obtained from outbreaks in certain herds indicates that these marked inflammatory conditions of the eyes of cattle are infectious in nature, but it is also very probable that certain predisposing factors play a rather important part; for example, dust, strong sunlight, and

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irritation or injury caused by insects or by contact with grasses, weeds, etc. Any injury or irritation makes the eye tissues more susceptible to infection.

The disease is widespread throughout the country. Although it is apparently not confined to any particular season, the disease is far more prevalent during spring and summer months. It affects young and old alike. There are few fatalities from the disease, but it is very important from an economic standpoint due to the loss of condition and body weight. Also, in the South, Pink Eye leads to that old curse, "Screw Worms."

First indications are a flow of tears and avoidance of light with tendency to keep the eyes closed. Marked reddening or inflammation develops as the disease progresses, eyelids become swollen, and sensitive. The discharge from the eyes soon becomes mixed with pus and may be streaked with blood. As the inflammation progresses the deeper structures of the eye become involved. The external surface of the eye assumes an early cloudiness. In more advanced cases there may be ulceration on the surface of eye, and even rupture of the eyeball which, of course, results in permanent injury. Naturally with such a sensitive organ affected, the animal will develop general disturbances, such as loss of appetite, debility, etc.

Prevention and treatment will probably remain more or less unsatisfactory until more definite information is available concerning the specific or primary cause of the condition. At the present, and always true, without specific knowledge as to cause, all efforts are devoted to developing treatments. Of many products on the market, one can safely say that they do reduce the suffering of the animal and aid in preventing secondary developments that would leave the animal with permanent injury. Sulfa drugs, silver products, and others belong in this category, all doing a fair job in treatment. However, efforts must still be concentrated on preventive measures. Very little can be offered in this field besides the mixed bacterins and separation of affected animals from the balance of the herd.

In conclusion and to summarize, this is one of many disease conditions in the Southwest that needs more attention from the livestock raiser, veterinarians and experimental representatives. Disease control is a wide field and has a long way to go.

It is wise in all cases of Pink Eye, especially in sheep and goats, to first check eyes for foreign bodies, such as grass, seeds, dirt, etc.

Boom in the Tung Belt

Condensed from Southern Agriculturist

Harold Severson

DEEP in the lower South, from Texas' Gulf Coast to northern Florida, a record fruit crop with a very direct bearing on the war is rapidly approaching maturity. By October or November, workers will begin gathering an estimated 28,000 to 30,000 tons of the brown, woody, peach-sized fruit. From it will come the highly strategic tung oil, so vital to America's war production program that every drop was diverted into military channels when hostilities started.

Offhand, it's difficult to associate our military conquests with the pale golden oil trickling from 12 tung mills in five Southern States. Nevertheless, America's booming military might is dependent upon just such a seemingly trivial item. After the war there will be a fascinating story to tell about tung's role in the final great victory, but now military secrecy forbids references to its wartime uses.

We formerly imported tung oil from China, buying as much as 150 million pounds back in 1935. Our own 1943 production of three million pounds was a mere drop in the bucket, and the Jap blockade meant none from China. Consequently, every drop we now produce is being used for military purposes.

In peacetime, American manufacturers made lavish use of tung oil in thousands of ways. However, the Chinese were ahead of them in appreciation of tung's wonderful qualities by a matter of five centuries. They used it for their famous lacquers, to waterproof masonry, to oil and calk their junks, to dress leather, to make floor varnishes. American firms utilized more than 80 per cent of the tung for quick-drying enamels, paints and varnishes. Next in line was the linoleum industry, and tung was also used in automobile brakebands, electrical insulation, and lining for tooth paste tubes.

Had it not been for L. S. Wilcox, American Consul General in Hankow, China, our war production would be hamstrung by tung oil shortages. Wilcox visited China's tung orchards growing on poor, sterile hills, and inspected primitive plants. Impressed by tung's unique properties, he sent some seed to America. In 1905, the U.S.D.A.

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made experimental plantings at Chico, California, and later plantings in California, in Florida, and as far north as the Carolinas. About 1912, ten trees were planted on the grounds of the Florida Experiment Station at Gainesville. Two of these trees were exceptionally productive and their seed played an important role in developing the tung industry of Florida and the remainder of the Tung Belt.

The tung plantings were backed by men who saw a chance for the South to get a new agricultural crop and a new industry. They knew the tung tree would grow only in a limited area in the Deep South and believed the crop could be milled by Southern plants.

Their reasoning was correct. Today large mills operate on a 24-hour schedule: three in Louisiana, four in Mississippi, three in Florida, and one apiece in Alabama and Georgia. Thanks to a handful of scientists like Dr. R. S. McKinney at Gainesville, Fla., and A. F. Freeman of the Bureau of Agricultural and Industrial Chemistry, at Bogalusa, La., together with Dr. Geo. F. Potter, Dr. Ernest Angelo, Dr. F. S. Lagasse, J. H. Painter and George M. Bahrt, of the Bureau of Plant Industry, American orchardists and plant operators get higher yields and a better quality of oil than the Chinese producers. The imported oil is colored and usually has considerable free fatty acid, whereas American oil, produced by modern machinery, is a very pale, practically neutral oil, far superior to Chinese.

But tung trees early proved very exacting in their requirements. They grow wild and untended in China, but American producers quickly learned that satisfactory yields are obtained only when the trees are heavily fertilized, pruned and planted with due allowance for their peculiar needs. Full yields cannot be expected for five or six years, although the tree bears after its second season. That characteristic handicap bars the subsistence farmer, who needs a cash crop each year since he has no income to carry him over until the trees are producing heavily. However, he can intercrop or pasture the middles between his trees until they are old enough to pay off.

Tung trees like plenty of rain —about 50 to 70 inches annually. However, they dislike "wet feet" so a well-drained site is necessary. Untimely freezes often take a heavy toll. The tree cannot tolerate cold weather during its blossoming period or before it goes into dormancy in the fall. Once dormant, however, it can stand considerable cold weather without injury. Dormant tung trees have been coated with ice in mid-winter without ill effect.

Most of the tung orchards in Mississippi and Louisiana where the bulk of the tung oils is produced are planted on cutover pine land. Generally speaking, the right soil is said to be one with a considerable amount of clay in it. The tung prefers slightly acid, rolling land that is easily drained. Hillsides, when properly terraced and fertilized, are quite satisfactory.

Tung producers are uniformly enthusiastic about possibilities in tung orchards, but warn of the pitfalls facing beginners. Cutover land is cheap, selling for around $4.50 to $10 an acre in Pearl River County, Mississippi, but an additional $30 to $35 per acre is necessary to blast out stumps and haul them to a rendering plant, terrace the slopes, and get the trees planted and fertilized. Tung orchards must be kept clean and free from weeds and grass, so the producer must be prepared to pay out money for field hands.

Big orchardists are producing the bulk of the tung oil in America. Smaller orchards scale all the way from a thousand acres down to an acre or two an small farms. Most of the small scale orchards —around 450—are found near Cairo, Georgia, where J. B. Wight, a pioneer tung grower, sold farmers on advantages of small plantings. Many farmers sell from $300 to $500 worth of tung nuts per year from their so-called fence-row trees.

The tung belt begins near Beaumont, Texas, where B. A. Steinhagen has a fair-sized grove, and extends eastward along the Gulf into northern Florida. It is approximately 100 miles wide. About half the tung fruit is grown in Pearl River County, Mississippi, with most of the country's production growing within a 100-mile radius of Bogalusa, just across the line in Louisiana.

At one time it was generally believed that tung trees were a bonanza crop that once planted would reward the orchardist with lavish yields. That was the promotional theme song during the early 30's, and suckers poured their savings into big tracts of cutover timber land. They soon found that tung orchards needed constant applications of folding money to be really productive. Most of them were absentee owners who knew less than nothing about orchards, especially tung orchards. Asked to pay out for terracing, upkeep of the groves, pruning and fertilizing, they were inclined to draw their purse strings tight and write off their losses as a bad investment.

In spite of this bad send-off, the tung industry continues to grow. Producers around Bogalusa and Picayune tell you with pride, "Our orchards will produce any-

where from a half-ton to two tons to the acre." At the present net price of $100 a ton, they're sitting pretty.

All the major tung producers are now banded together in the American Tung Oil Association, which recently merged with a group of Mississippi and Louisiana orchardists known as the United Tung Growers' Association. Approximately 75 per cent of the American producers are grouped in the Bogalusa area, where an aristocracy of tung men is developing. L. O. Crosby, Sr., located at Picayune, has around 5,000 acres of his own and supervises another 35,000. Out-of-state owners contract with Mr. Crosby and others to raise and process their tung fruit. Mr. Crosby's mill is one of the largest and most modern in the world today.

There is plenty of room left for other orchardists. Mindful of the old adage, "The best orchards are those fertilized by the footsteps of the owner," men like Ballard, Crosby and Wight hope to see more small orchards coming into existence.

"We need to get our local farmers into this business," says Mr. Crosby. "They can plant seed in the spring and transplant seedlings in the winter. It doesn't cost them much — just a little money for tung seed, cover crop seed, and fertilizer."

Six years ago, L. J. ("Dutch") Young and brother, of Ohio, bought a large acreage midway between Bogalusa and Poplarville. Neither knew anything about tung orchards with the exception of what they had heard from Joe LaFortune of Lucedale, Mississippi. But that didn't bother them in the least. Dutch brought his attractive young wife to a new home and started to grow tung trees. He met plenty of difficulties, but today he has 173 acres in tung trees which will net him close to $10,000 this fall.

Row-cropping between tung tree rows is not followed very extensively in the Tung Belt. Experts agree that the producers' incomes would be doubled if this practice were more generally adopted.

"The cornerstone of success in the tung industry is use of cover crops," asserts Dr. Potter.

With good luck, tung farmers should get back their money inside of four or five years. And by growing crops like cotton, corn or sweet potatoes between the tung rows, they'll be reaping a cash crop each season. In addition, they'll put thousands of part-time workers on the payroll during the fall and winter months garnering the nuts.

Tung fruits fall from the trees in late autumn and are allowed to lie on the ground until they dry out sufficiently to be safely stored without danger of heating. They

are then collected and stored in ventilated bins until they are ready for hulling and pressing.

Meanwhile, our armed forces make good use of the tung oil preparations which have developed from the handful of seed sent from China to America four decades ago. And the pale golden oil is bringing a new measure of prosperity to ex-lumbermen, farmers and absentee owners scattered all the way from Maine to California. Whether the producer has two acres or 6,000 of fine tung trees, he stands a good chance to meet the challenge of the income tax collector. That's prosperity in any language.

BOOKS OF CURRENT INTEREST ON LAND USE

THE AMERICAN LAND—Its History and Its Uses, by William R. Van Dersal, biologist in the United States Department of Agriculture.

What America was in the beginning, what American land is now, and an inkling of what it may be in the future form the subject of this interesting new book. It comes as a timely contribution in an era when Americans are rediscovering the American soil.

Publishers: Oxford University Press 215 pages $3.75

AN AGRICULTURAL TESTAMENT — by Sir Albert Howard, C.I.E., M.A., former Director, Institute of Plant Industry, Indore, and Agricultural Adviser for Central India and Rajputana.

This is a significant book for gardeners and farmers who are interested in the use of organic fertilizers. Sir Albert has had many years of active experience in the field of organic fertilizers and is an accepted leading authority on the subject.

Publishers: Oxford University Press 253 pages $3.50

PLOWMAN'S FOLLY — by Edward H. Faulkner, agricultural expert and teacher, soil and crop investigator; formerly county agent in Kentucky and Ohio.

This book is described as perhaps the most important challenge to agricultural theory yet advanced in this country. The author points out that soilimpoverishment, erosion, decreasing crop yields may be traced to the accepted practice of plowing natural fertilizers deep into the soil.

Publishers: Grosset and Dunlap 161 pages $1.00

NATURAL PRINCIPLES OF LAND USE — by Edward H. Graham, Chief of the Biology Division of the Soil Conservation Service.

Natural Principles of Land Use deals with ways in which a knowledge of biological principles can be profitably applied to the management of farm land, forests, range and wildlife. Excellent photographs are used to illustrate the absorbing material of this book.

Publishers: Oxford University Press 275 pages $3.50

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

A Living from Bees—By Frank C. Pellett, Field Editor of American Bee Journal. Orange Judd Publishing Co., Inc. (1943). $2.00.

America's Garden Book — By Louise Bush-Brown and James Bush-Brown. Charles Scribner's Sons (1939). $3.50.

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean of the School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $2.85.

Beef Cattle — By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Sons, Inc. $4.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers (1941). $2.00.

Chicken Raising Made Easy — By Paul W. Chapman, Dean of College of Agriculture, University of Georgia. (1943) The Macmillan Co., $1.75.

Dairy Cattle and Milk Production — By Clarence H. Eckles, B.S.A., D.Sc., late Chief, Div. of Dairy Husbandry, Univ. of Minnesota. The Macmillan Co. $3.90.

Dairy Science — By W. E. Petersen, Ph.D., Assoc. Prof. and Assoc. Dairy Husbandryman, Univ. of Minn. Edited by R. W. Gregory. J. B. Lippincott Company (1939). $4.00.

Diseases and Parasites of Poultry — By Edgar Hugh Barger, D.V.M., Berkeley, Calif., and L. E. Card, Ph.D., Prof. of Poultry Husbandry, Univ. of Illinois. Lea & Febiger. 3rd Edition (1943). $3.75.

Farm Shop Practice—By Mack M. Jones, M.S., Agri. Engineering, Univ. of Mo. McGraw-Hill Book Co., Inc. $2.75.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.00.

Farm Management and Marketing—By V. B. Hart, Ext. Professor of Farm Management; M. C. Bond, Ext. Professor of Marketing; L. C. Cunningham, Ext. Asso. Professor of Farm Management; all of N. Y. State College of Agriculture, Cornell University. Publishers: John Wiley & Sons, Inc. (1942). $2.75.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. (1941). $3.00.

Farm Records—By John A. Hopkins, Ph.D., Asso. Prof. of Economics, Iowa State College. Iowa State College Press. $2.50.

Grow Your Own Fruit—By M. G. Kains, formerly with U. S. Dept. of Agriculture; Professor of Horticulture, Pennsylvania State College. Charles Scribner's Sons. $3.50.

How to Raise Rabbits for Food and War—By Frank G. Ashbrook, Fish and Wildlife Service, U. S. Dept. of the Interior. Orange Judd Publishing Co., Inc. (1943). $2.00.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Production—By Walter H. Peters, Chief of the Division of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $3.50.

Livestock Judging Handbook — By Julius E. Nordby and W. Malcolm Beeson, Ph.D., Asst. Professors Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

Modern Agricultural Mathematics — By Maurice Nadler, B.S., A.M. Dept. of Mathematics, Newtown High School, Long Island. Orange Judd Publishing Co., Inc. (1942). $2.00.

Modern Farmers' Cyclopedia of Agriculture—By Earley Vernon Wilcox, Ph.D., Agricultural Writer, formerly with U. S. Dept. of Agriculture. Orange Judd Publishing Co., Inc. (1944). $4.50.

Plowman's Folly—By Edward H. Faulkner. (1943) Grosset and Dunlap. $1.00.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry, Mo. State Univ. J. B. Lippincott Co. $5.00.

Profitable Poultry Keeping — By H. Clyde Knandel, Prof. and Head, Dept. of Poultry Husb., Penn State College. Orange Judd Publishing Co., Inc. $3.00.

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $3.75.

Practical Horse Breeding and Training — By Jack Widmer. Charles Scribner's Sons (1942). $3.00.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue University. The Interstate Printers & Publishers. $1.80.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.00.

Soil Conservation — By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture. McGraw-Hill Book Company, Inc. $6.00.

Some Common Diseases of the Horse—By George R. Conn, B.S.A.H., D.V.M., Orange Judd Publishing Co., Inc. (1942). $1.50.

Some Common Diseases of Cattle—By George R. Conn, B.S.A.H., D.V.M. Orange Judd Publishing Co., Inc. (1942). $1.50.

Soybeans—Gold from the Soil — By Edward Jerome Dies. The Macmillan Co. $1.75.

The Home Veterinarian's Handbook—By E. T. Baker, Veterinarian, Moscow, Idaho. The Macmillan Company (1943). $2.50.

The Farm Primer—By Walter Magnes Teller, formerly with the Farm Security Administration, U. S. D. A. David McKay Co. $2.50.

The Western Horse—Its Training, Type and Marketing. By John A. Gorman, Asso. Prof. Animal Production, Univ. of Wyoming. The Interstate Printers and Publishers. $1.65.

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COMMENTS

From Somewhere in North Africa—

"The February and March issues of the Farmer's Digest came yesterday. You should have seen with what eagerness they were greeted by various people in this office. Even our French liaison officer wanted a copy to take home right away. I think these Digests are going to be very worthwhile."

From Somewhere in the South Pacific—

"The copy of your magazine which I receive through my subscription is enjoyed very much. It enables me to keep informed on the important agricultural topics so that when I return, after the Japs are eliminated, I can more easily get back into agricultural work."

"Before I left for the Armed Forces I had the opportunity to read several copies of the Farmer's Digest, and I was very much impressed. I feel that a digest of pertinent farm news, as found in this magazine, would be of much interest and value to me as I am as keenly interested in keeping up on agriculture as on other matters." —*Colorado*

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"I received my first issue of the Farmer's Digest and have just completed reading everything from front to back. I sincerely believe that this is a very worthwhile contribution to the agricultural field. I wish that more people could read this magazine." —*Illinois*

"Please renew my subscription to the Farmer's Digest. I find this magazine a great help to my cooperators who visit the office." *Soil Conservation Service—Georgia*

"I think a lot of the Digest and look forward to its coming. Even though I am a farmer, I am having to fill in a teaching job in the local high school where we are using the Digest a great deal in our agriculture class." —*Iowa*

"May I take this opportunity of expressing to you how much I enjoy reading the Farmer's Digest, and how useful is the information contained therein." —*Canada*

"I have had placed in my hands several copies of the Farmer's Digest and have found them very helpful. I am asking you to place me on your subscription list for the coming year." —*Iowa*

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COMMENTS

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"Please renew my subscription to the Farmer's Digest. I find this magazine a great help to my cooperators who visit the office." *Soil Conservation Service—Georgia*

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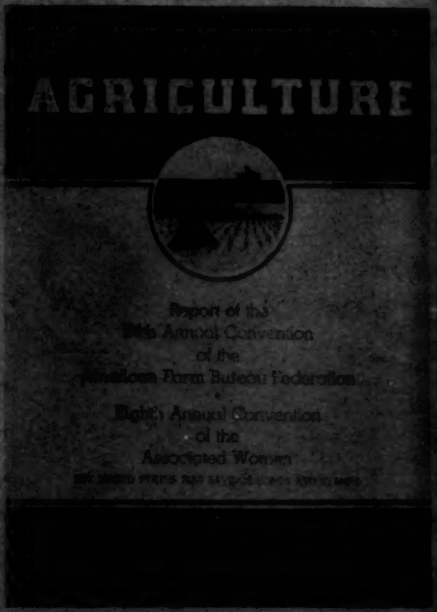

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